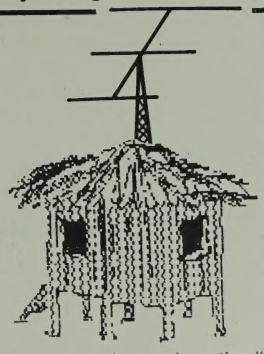
Digital Digest

Vol. 3 No. 1 **Devoted entirely to Digital Amateur Radio Communications** January/February 1990

In This Issue:



From The Publisher's Shack

A new year! "Out with the old, in with the new", as the saying goes. Introducing the new (and we hope you'll agree, improved) Digital Digest.

We've changed the cover to a heavier, semi-gloss stock to improve the quality and durability. The page layout is cleaner with topics more defined. All in all we've endeavored to clean-up the packaging more befitting the content, featuring some of amateur radio's most knowledgeable participants in the areas of computers and digital communications. Now there's one more added to our staff - Stan Horzepa, WA1LOU.

Stan, as most of you already know, is editor of The ARRL Gateway Newsletter, does the "On-Line" column in *QST*, and has written various books and articles on digital communications. Apple Macintosh owners, in particular, will appreciate Stan's newest column here in Digital Digest, "MacHam World." If you're a Mac owner, Stan will keep you on top of all the latest news, software, hardware, etc... with the info you'll need to get the most from the Mac in your shack. Stan is a most welcome addition to our fine DD staff.

Another new column, is Digital Bits. D-Bits is intended to be a virtual potpourri of information on digital communications and computers. The column will have tidbits of info on all modes of digital operations, computers, software, history, insights, perhaps even a construction article or two. This is a section in the Digest open to all who would like to contribute - you'll get to see your name in lights (or should we say, print). Don't be shy. If you're doing something, or know something you'd like to share with the digital community... please let us know. To get the ball rolling, Norm Sternberg kicks off this issue's D-Bits column with a continuation on the history of digital communications.

Our personal thanks to Don Stoner, W6TNS, who recently informed us that Digital Digest earned a mention in the introductory chapter of his new book, "Amateur Radio - The King of Hobbies." Quoting from the book, "...it's the premier publication for the one's and zero's crowd..." Thanks Don, for the mention, and we will continue our work to live up to the premise.

Buckmaster Publishing has offered to begin placing Digital Digest on microfiche. We are flattered to become a part of the microfiche fraternity. Now when you see the Buckmaster microfiche ads in QST, HAM RADIO and 73 (did I miss anyone?), and read about how you'll save loads of space

(cont'd on page 3)

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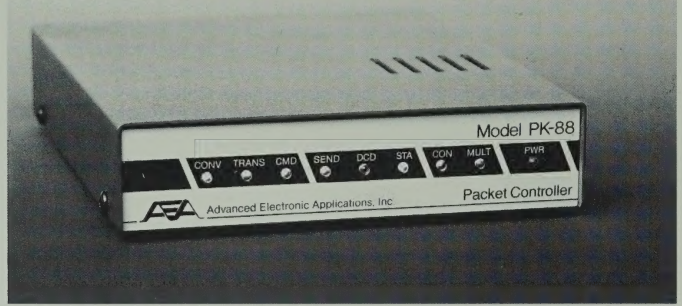
AEA's PK-88™ Packet Controller



Unique operating features with a proven hardware and software design make AEA's PK-88 your best choice in packet radio - now with MailDrop, an 8KBytes efficient personal Mailbox with selectable third-party traffic. The MailDrop uses a subset of the well-known WØRLI/WA7MBL packet BBS commands. When your PK-88 MailDrop is active, other stations can connect to your PK-88, leave messages for you or read messages from you. You can also store a single message or up to 15 separately numbered messages. Your MailDrop also accepts inbound mail forwarding from your local WØRLI/WA7MBL auto-forwarding packet BBSs.

The PK-88's internal KISS Mode is your direct interface to KA9Q's "NET" TCP/IP protocol suite - a single KISS command presets all packet parameters for TCP/IP operation. AEA's unique Host Mode provides the type of complete interface protocol preferred by many professional programmers for efficient control of the PK-88 by external programs and special applications. Your PK-88 also accepts special "NET/ROM" EPROMs provided by Software 2000, Inc., for Level Three node operation and networking.

In addition to all the features of a "standard" TNC, the PK-88 offers features not found in any other TNC:

- WHYNOT command - Shows reasons why some received packets are not displayed.
- AUDELAY command - Reduces spurious emissions in slow-switching radios.
- "Packet Dump Suppression" - Prevents dumping unsent packets on the radio channel when the link fails.
- Prioritized Acknowledgement (ACK) protocol improves performance on busy packet channels.
- CUSTOM command - Allows limited PK-88 customization for non-standard applications.
- Enhanced MBX command - Permits display of the data in I- and UI-frames, without packet headers and without retries and repeats.
- Enhanced MPROTO command - Suppresses display of non-ASCII packets from Level Three switches and network nodes.
- Unique MFILTER value $80 - Suppresses all graphics and control characters except TAB, CR and LF.
- Unique DFROM command - Permits selective digipeating ("Accept" or "Reject" digipeater operation by call signs).

Specifications:

- Processor: Zilog Z80. RAM: Battery backed, 32K Bytes. ROM: 32K Bytes
- Hardware HDLC: Zilog 8530 SCC

Modem:

- Modulator/Demodulator: AMD 7910 "World Chip"(tm), with differential AM detection and phase-continuous sinewave AFSK generator
- Modulator Output Level: Adjustable, 5 to 300 millivolts RMS
- Input Sensitivity: 5 millivolts RMS
- Input Range: 5 to 770 millivolts RMS
- External Modem Connector for use with external modem
- Hardware Watchdog Timer: One-minute time-out

Rear Panel Input/Output Connections:

- Radio Interface: Locking eight-pin; Receive Audio, Transmit Audio, PTT, Auxiliary Squelch, Ground
- Audio Input/Output: 3.5mm mini-plug
- External Modem: Five pins on DB-25; Transmit Data, Receive Data, Data Carrier Detect, Clock, Ground
- Terminal Interface: Standard RS-232 25-pin DB-25 connector
- Terminal Data Rates: Autobaud settings at 300, 1200, 2400, 4800, 9600. TBAUD adds 45, 50, 57, 75, 100, 110, 150, 200, 400, 600 and 19,200 BPS terminal rates
- HDLC Link Data Rates: 45, 50, 57, 75, 100, 110, 150, 200, 300, 400, 600, 1200, 2400, 4800, 9600, 19200 BPS

Front Panel LED Indicators:

- Converse, Transparent, Command, Send, Data Carrier Detect, Status, Connect, Multiple Connect, Power

Power:

- +12 to +16 VDC @ 550mA, coaxial power connector, (center pin positive), Model AC-1 120 VAC wall adapter available

Physical:

- 7.5"W x 6"D x 1.5"H; Weight 2lbs.,6oz.

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(The Publisher's Shack - cont'd)

and hundreds of pounds by ordering your back issues on microfiche, you'll understand why we're so flattered. Yes, because right now you can order D-D on microfiche... all one pound's worth of seven back issues! What a difference a few decades of publishing can make! At the moment, we'll settle for getting this next decade under our belt, keeping you abreast of all the exciting developments sure to unfold in the wonderful world of amateur digital communications.

Thanks to all for your support in 1989... the best is yet to come. Stay Tuned!

73, Tom / WA8DXD

Automatic Control of HF Data Communications Proposed...

On December 12, ARRL counsel Chris Imlay, N3AKD, filed a petition for rule making with the FCC seeking the adoption of rules to permit limited HF RTTY and data communication under automatic control. The 24-page petition draws on the experience gained during the past 2-1/2 years under the STA granted to the ARRL in mid-1987 permitting a limited number of packet-radio stations (known as "SKIPNET") to operate under automatic control on specific HF frequencies forming an organized "long haul" message forwarding network. The League's conclusion, based on this experience, is that the desirability of automatic operation on the HF bands has been firmly established and, in fact, is now an integral part of the normal Amateur Radio activity in all ITU Regions.

The ARRL's proposal seeks inclusion of automatically controlled AMTOR and Baudot as well as data modes. In the petition, ARRL says, "the feasibility of automatically controlled operation on AMTOR has been demonstrated by US amateurs operating under special temporary authority. ... AMTOR is more robust than is packet radio and is used to bridge difficult radio paths. ...Thus, its operations under automatic control is not only feasible, but necessary for the development and efficient operation of amateur networks. ...manually controlled Baudot RTTY 'mailboxes' (or MSOs) have been active in the Amateur Radio Service since the early 1980s. ...the software controlling the mailboxes has provisions which allow the interrogating station to ask for repeats. Manual control of these mailboxes...is an unnecessary burden on the mailbox system operators. ... The technology and operational experience using each of these modes has matured to the point that this is now possible. ...the benefits of automatic operation are shared by amateur operators worldwide and are instantly available to provide public service during disasters."

The petition seeks designation of the following band segments as being available (not exclusively) for automatic control of RTTY and data transmissions: 3.605 to 3.615 MHz, 7.035 to 7.045 MHz, 10.140 to 10.150 MHz, 14.090 to 14.100 MHz, 18.100 to 18.110 MHz, 21.090 to 21.100 MHz, 24.920 to 24.930 MHz, 28.100 to 28.120 MHz.

In a separate letter to SKIPNET members, ARRL Executive Vice President Dave Sumner, K1ZZ, explained why these particular frequencies are suggested in ARRL's petition. Dave said that the ranges chosen in most bands are probably self-evident except for those in the 20- and 40-meter bands.

"The specific frequencies used by SKIPNET stations have shown it's possible to shoehorn in with other US users. But, we have received complaints from societies in other countries about HF packet-radio frequencies, particularly in the 20- and 40-meter bands.

"On 20 meters, nearly every other country operates phone in the 14.100-14.150 MHz range, and packet-radio operations in the lower part of that range have been a continual cause of concern to them. This has been the case in all ITU/IARU Regions including Region II -- the Americas. The fact that some of their own packet-radio operators use frequencies above 14.100 has not convinced the societies in other countries that this is a good place for packet radio. The worldwide consensus (with some reluctance on our part) is that packet radio should operate below 14.100. Of course, that puts pressure on the Baudot RTTYers and AMTOR RTTYers just below them in frequency and, ultimately, on the CW operations.

"On 40 meters, most countries have a narrower band -- only 7.0 to 7.1 MHz -- into which they must squeeze CW, RTTY, packet radio, phone and image communications. Around 7.040, or even as low as 7.030, is where their phone band starts. So, you can understand why there might be contention over packet radio and RTTY around 7.090.

"The frequency segments for each band were chosen after careful review of domestic and international implications. While we knew to begin with that there was no such thing as a "perfect fit," we had to try for a "best fit" solution. Please bear in mind that we now have a viable packet-radio network that is worldwide in scope. As such, we need to use frequencies that are compatible with the rest of the world. Even with the frequency segments chosen, there may still be the need for future adjustments, both by us and in other countries, to finally arrive at common segments for automatic operation.

"We anticipate that individuals may wish to suggest some changes in the frequency segments proposed by the League. We believe such input to be helpful in cases where commentors take the time to consider the domestic and international implications of their proposals."

The FCC has not yet assigned an RM number to this petition.

Source: Gateway

Digital Digest -PACKET

by Lynn W. Taylor, WB6UUT
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The ISO Model, Layers 4-7

This issue we will finish our discussion of AX.25 by "climbing to the top" of the ISO ladder.

To review briefly, the International Standards Organization defines an Open Systems Interconnect model (commonly called the OSI model) which defines seven layers: Physical, Data Link, Network, Transport, Session, Presentation and Application.

Layer 1 (the physical layer) is typically 2m FM AFSK, while layer 2 is AX.25 Layer 2.

Layer 3 is a bit more slippery, since there are several contenders for the network layer. Layer 3 tries to solve the problem of how to get from point "A" to point "B" without forcing the user to discover every single intermediate point.

The Transport Layer:

Layer 4 can also be called the host-host layer, since it gets the job of linking two computers and isolating them from the details (software and hardware) of the lower level network. It takes a message generated by one host, breaks them into messages that can be handled by the network layer and at the other end reassembles the network layer messages into the original larger message.

Typically, the transport layer will establish one network layer connection between hosts, but it may establish more than one connection if a high transfer rate is needed (the network layer should route these connections differently to avoid congestion), or take several Layer 4 connections and send them across a single connection on the lower level if the cost of a connection is high and the data rate low.

The transport protocol is usually handled as software in the host computers rather than hardware.

The Session Layer:

In a full OSI model network, layer 5 is the lowest layer visible to the user. Connections here are called Sessions.

A Session may be a user connecting to another computer as a remote user, or a program or process running on one computer connecting to a similar process on another system.

The session layer provides a level of security (who is allowed to establish connections), can provide error recovery if a transport connection breaks down in the middle of the session, and other services specific to the application.

The Presentation Layer:

At layer 6, the network tries to hide the hardware and software details from the other end of the link.

For example, the Presentation layer can define a standard set of screen-control characters (changing the color or intensity of text, moving the cursor, etc.), and translates the "network standard" commands to match your terminal.

The Presentation layer can also perform data compression. Converting common words to "tokens" which are expanded back to the normal text at the other end, or using different length codes to more efficiently transmit text.

The Application Layer:

Here the network disappears completely: at layer 7 we have what appears to be a single gigantic computer with dozens (hundreds? thousands??) of users. The users and the computers they are using are spread throughout the network, and work is divided between all of the machines in the network.

A real-life example of this is the European SWIFT banking network. All account information for client banks is spread across computers throughout Europe, with each record duplicated at several widely separate sites. In the event of a hardware failure at any one site, the other computers in the network take over it's load and insure that the information stored at that site is now backed up at additional locations.

Crystal Ball:

It seems the beginning of a new decade is the time to look into the future. Rather than predict when we'll have a full OSI model network, I'm going to look at how far we should go in Amateur Packet Radio.

We started up the OSI model almost by accident. AMSAT wanted a standard protocol so they could begin designing satellites with packet capability. TAPR found that folks were available who were working with X.25 networks and knew how to implement that protocol, and the major players found themselves locked in a room until they could agree on one protocol.

AX.25 was born.

Since X.25 is an OSI model protocol, I think many have assumed that we would continue up the Open Systems Interconnect ladder.

Let's look at each layer again, and ask "What can this bring to my enjoyment of Amateur Radio?"

Layer 3: A useful layer 3 network speeds data on it's way, allows error-correction on a hop-by-hop basis, and generally reduces channel loading. Useful.

Layer 4: Are we connecting host-to-host? Not really, but many higher applications would benefit from a Transport layer. It is not uncommon for the network and transport layers to be combined into a single layer.

Layer 5: In a sense, we have sessions now: you connect to another station, carry on your QSO, then disconnect _ a session. Sessions between bulletin boards handle mail forwarding, etc.

I'm sure we'll see numerous session protocols appear as more applications arrive.

Layer 6: One of my common gripes with current Packet Radio practices is the use of control characters, even the simple ones such as Tab. A rudimentary layer 6 exists now in every TNC which adds linefeeds to packets where needed, etc.

One of my pet ideas is data compression: If we could compress plain text packets by 50%, we could increase network throughput without investing in additional hardware or faster modems. Note that a third of each packet now is "key up" time (the TXD parameter), so cutting the packet size in half through compression would not double network speed.

Layer 7: The ARES/Data program by Weo Moerner, WN6I, et. al. is a good example of a useful Application layer _ picture Red Cross or Civil Defense workers sitting at terminals able to get detailed information about available facilities and field personnel, or find out where disaster victims are, and which shelters are overloaded or underused. Another good example is the White Pages project originally set up by WD6CMU which catalogs all amateurs on packet and where mail should be directed in the

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Bulletin Board system.

These applications exist, but as sort-of "stand alone" systems where users connect and interact with remote systems. In a true layer 7, the program to handle these tasks would exist on every computer in the network, requests for information would flow between machines, not from remote terminals to central computers. Fortunately, several versions of each layer, and several networks, for that matter, can coexist in a single environment.

We will continue to see a mixed network: some happily ragchewing with only a layer 2, others busy writing software to bring "amazing new capabilities" to Amateur radio.

Predictions:

Faster user radios: look for the TAPR packetRADIO to become readily available sometime during late 1990 or early 1991. This relatively inexpensive 9600 baud VHF rig will finally bring faster network access for users _ as much by reducing the current, awful 300 msec. TXD as by the faster data rate.

Fast backbones: This may be wishful thinking, but several people are experimenting with microwave transceivers and ethernet controllers to try and push connections between areas to 1 megabit/second speeds and beyond.

This development will bring the "cheap, long haul packet" long promised to reality.

Smarter Terminal Node Controllers: Attention all TNC manufacturers! Isn't it time to abandon the Z-80?

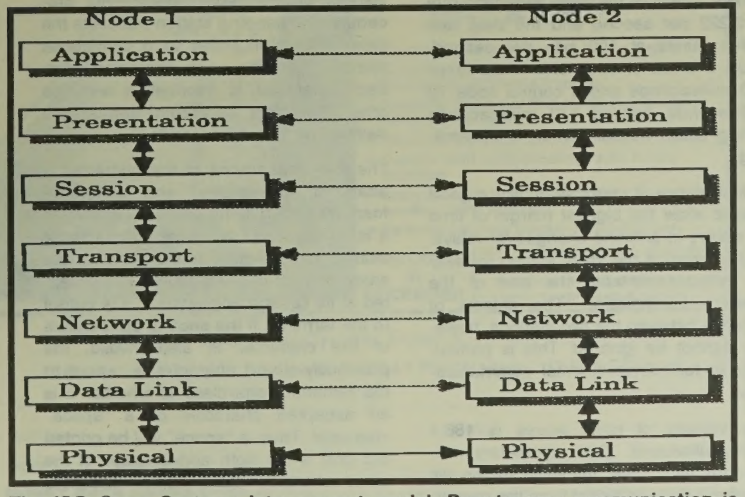
Despite projects like the TAPR NNC and the PS/186, the idea of separate hardware for network nodes and user nodes has not caught on: most of the current layer 3 networks run on the TNC-2 or compatible hardware.

Development tools for the 8088 processor are readily available, and the processor chips themselves are almost as inexpensive as the Z-80.

A future TNC based on a more powerful processor could be expanded to a full-blown multi-port node by adding "daughter boards" with additional channels.

Packet users will "rediscover" ragchewing: I keep reading that packet isn't for ragchewing. Two things are missing: packet operators need to call CQ more often and need to WATCH for stations calling CQ more often.

Most important, as we begin the decade of the 90's, remember that Amateur Radio is a hobby. Packet, like Amateur Radio in general is diverse, and there is something out there for everyone. Find your niche, and join in!



The ISO Open Systems Interconnect model. Peer-to-peer communication is shown as gray arrows, while solid lines represent actual communications paths.

by **Norman Sternberg, W2JUP**
279 Adirondack Drive • Farmingville, NY 11738

Sitor Synchronization

Considering that SITOR is a synchronous system with no start and stop bits, the timing at both ends must be stable. Some means must be found to get the two stations in step and to keep then that way over a period of time, even if the two clocks are only slightly different in speed.

The synchronization procedure starts with the first station (the master) send-ing a special synchronization block repeatedly. The slave station continually shifts in received bits until 21 consecutive bits correspond exactly with the expected synchronization pattern. The slave then starts to reply in the gaps, sending back one of the control codes.

The master station, meanwhile, has been shifting in received data bits during the gaps in its transmissions. When it recognizes two consecutive control codes, it stops sending synchronization blocks and changes to sending traffic. In fact, to guard against the possibility of the slave getting the synchroni-zation pattern right, just by chance, the master sends two different synchro-nization blocks alternately, and the slave must get them both in order to lock in correctly . The first of these blocks has an RQ in the second character, with two alphabetic characters in the other two positions.

At the same time, the second block has two more alphabetic characters in the first two positions with an RQ in the third. The RQ characters prevent the four alphabetic characters from printing out at the slave station. These four characters can be chosen by the users, but must be agreed upon beforehand by the operators at the two stations concerned.

In SITOR, the commercial maritime service, these characters are derived from the ship's telex number and form a selective-calling code, or SELCAL. As used in the Amateur Radio Service (AMTOR: AMateur Teleprinting Over Radio), the four-character group selective-calling code suggested for all random communi-cations is derived from the call letters of the station.

To accommodate any slow drift in timing between the two stations after initial contact, the slave station monitors the timing of data transitions received from the master. If these tend to drift away from the optimum point, i.e., halfway between the adjacent sampling instants, the local clock is shifted to correct this. Thus, the slave timing follows exactly that of the master. The master uses the same technique to make sure it is sampling the signal from the slave at the optimum instants.

RESYNCHRONIZATION

Because timing drift correction is very slow in action, it is not easily dis-turbed by short periods of interference. But if contact is lost completely for some period of time, both stations must reestablish the correct timing by manual operator intervention - restarting the contact as if commencing a new communication session.

When both stations have been receiving errors or requests for repetition for 32 blocks, then both stations will automatically return to the synchronization procedure, with the sending station retaining any unsent message in a buffer. The remarkable feature of the system is that it remembers which station was sending before the interruption, and when back in synchronization again, a change of direction is made automatically if required. The remainder of the interrupted message is then sent without gaps or errors

TIMING CONSIDERATIONS

CCIR Recommendation 476, which defines SITOR in the international maritime radio

service, specifies the block repetition rate at 2.222 per second and the data rate within bursts at 100 bits per second. Thus, a block of three characters takes 210 milliseconds and a control code 70 milliseconds, leaving 170 milli-seconds during which neither station is transmitting.

At first glance, it might seem like a good idea to allow the biggest margin of time for delays in antenna changeover relays, and to arrange the slave station to reply 85 milliseconds after the end of the master's transmission. The ef-fects of distance between the two stations, however, cannot be ignored. This is particularly so for intercontinental communications.

The velocity of radio waves is 186.4 miles/millisecond (300 kilometers/millisecond). As a result, the slave station will receive a delayed signal from the master, and the resultant reply will be received late at the master sta-tion by two milliseconds for every 186.4 miles (300 kilometers) separating the two stations. Thus, to make sure that this slave reply is not obliterated by the next master transmission on long distance communications, the slave must reply as soon as possible after receiving the signals from the master.

With practical equipment, and taking into account delays through various fil-ters in the equipment, it looks as though 12,400 miles (20,000 kilometers) is about the maximum range for ARQ to function successfully. In other words, ARQ will just about cover the world on HF, at least by short path, but rules out some satellite possibilities and moon bounce.

FEC - FORWARD ERROR CORRECTION - MODE B

In addition to ARQ, SITOR amd AMTOR provide an alternate mode for situations in which the interactive or "handshake" operation is unsuitable. For example, in general broadcasts such as weather and press transmissions, traffic and message lists, emergency notices to mariners, and round-table types of "network" operation.

In such cases, it is clear that synchronization and "handshaking" cannot be established between one station and more than one other. Yet, the majority of services that use SITOR do have a definite need for such "broadcast" facilities. This is the role played by SITOR's FEC or Forward Error Correction mode. The form of FEC used in TOR depends on time diversity; each character is transmit-ted twice.

Instead of the usual bursty ARQ procedure, the sending station transmits the same character codes in a continuous stream, repeating each character twice. Each character is interleaved with the other characters, its second appearance delayed by 280 milliseconds.

The first appearance of the character is analyzed for validity, and stored in memory if valid. If the character is invalid, it is rejected and a "space" character is written into memory in its place. If the same character is val-idated and accepted at its second appearance, it is output to the terminal. If the second appearance of the character is also invalid, the previously-stored character is output to the terminal, regardless of whether it is an accepted character or a "space" character. Thus, a "space" will be printed out only when both appearances of the same character have failed validation.

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The human operator can usually fill in the occasional missing characters found in a word.

The main point is that the terminal or printed page will not be filled with "garbage" or mutilated data. The station equipment can remain tuned to an empty, noise-filled channel without displaying continuous streams of garbled characters on the screen or page. Until valid data is received, the terminal will display nothing.

For the station operator, FEC operation is almost identical to conventional radioteleprinter or telex service; each station transmits in turn. The error detection and correction available with FEC is not as effective as that with ARQ. However, in those cases where ARQ is not workable because of multiple station circumstances, FEC's performance characteristics greatly surpass con-ventional Baudot-Murray and ASCII RTTY service.

SAREX - 1990...

Space Shuttle Columbia is scheduled for a ten day mission (STS-35), to be launched in the evening of April 26, 1990. Dr. Ron Parise, WA4SIR, a Payload Specialist, has been cleared by NASA to operate voice and packet during this flight. By coincidence, the commencement of WA4SIR's operation coincides with the 1990 Dayton Hamvention and consideration will be given to linking these two major ham radio events.

This is followed by STS-37, Space Shuttle Atlantis is scheduled for a five day mission to be launched on June 4, 1990. Marine Corps Lt. Col. Ken Cameron, KB5AWP, the pilot, has been authorized to operate voice, packet, slow-scan amateur television and fast-scan amateur television. Ironically, this flight too coincides with another major amateur radio gathering. The 1990 ARRL National Convention takes place in Kansas City Missouri, June 8-9, overlapping the final two days of the STS-37 flight. Both flights will use the amateur 2 meter band.

The equipment is now undergoing final testing at the Johnson Space Center, in Houston, Texas. Packet operations will be continuous for periods of about 12 hours daily. Most amateurs world wide should be able to send messages through the shuttle using this mode. Voice and television operations will be dependent on the astronaut's work schedule but early flight plans indicate that they should have an hour or more available daily.

The orbital track of both missions will be at an inclination of approximately 28.5 degrees. This southerly orbit will put most of the United States out of range during the times when the astronauts are visible, so AMSAT-NA plans to establish ground station networks over strategic locations to relay communications. Stations in Africa, Australia, Mexico and South America are now being contacted by AMSAT. Japan is also under consideration.

Each general area will be coordinated by a control station, who will in turn be in direct contact with the operations command station, W5PRR, at Johnson Space Center in Houston, Texas. Amateur satellites, commercial satellite channels, shortwave links and other telecommunications facilities will be used to provide this real-time hookup. Communications will be broadcast by a specifically designated station and repeated to WA3NAN at the Goddard Spaceflight Center near Washington D.C. and W6VIO at the Jet Propulsion Laboratory in Pasadena, California.

These locations, and W1AW, at ARRL Headquarters in Newington, Connecticut, will be coordinating stations. They will broadcast on most amateur frequencies including 75, 40, 20, 15 and 10 meter SSB, 24 hours a day, during the missions. Using this as their source, numerous VHF and UHF repeaters will be able to re-transmit their material for local dissemination. The network will carry official NASA Mission Commentary, frequent bulletins to advise the amateur community of planned transmissions by the astronauts, and all two-way voice and TV transmissions with the spacecraft. Mission planning information also will be fed by computer from the Johnson Space Center to coordinating stations to insure the accuracy of their bulletins.

The digital network will also provide

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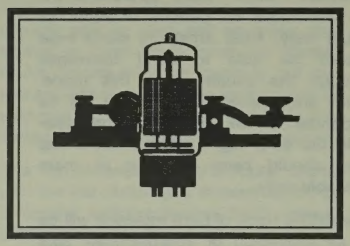
A History Of Digital Communications



Norman Sternberg, W2JUP inaugerates this new column with a continuation of digital history from a series of articles which began with the July/Aug '89 issue of Digital Digest - Editor

RTTY

The term "RTTY" does not define any single data code or speed. Contrary to some information published in recent radio equipment manuals, "RTTY" means only one thing - "radioteletypewriter", or "radioteleprinter service". It does not mean "radioteletype"! The term "teletype" is a registered trade mark of the Teletype Corporation, and strictly speaking, should be used only when referring to that company's products.

"RTTY" does not mean Baudot - ASCII code is also a form of "RTTY". SITOR modes and packet radio are also forms of "RTTY". Think of human communication; all humans share a common communication mode: speech. The languages change from place to place. Baudot-Murray code and ASCII and SITOR codes are just different languages used in the same mode - the difference between French and Spanish and Italian and Portuguese! If you extend this rationale, SITOR and packet radio are additional digital languages within the same mode, but with flavors all their own.

BAUDOT-MURRAY

The Baudot-Murray code dates from about 1874, when Emile Baudot, a Lieutenant in the French Telegraph Service, developed the Baudot distributor for telegraphy, using five data bits to define each character, with a "start" bit and a "stop" bit to identify the beginning and end of each character. With five bit positions, the total number of possible combinations equals 2E5, or 32. Our language has 26 letters (upper case only!), 10 numerical digits, and 9 common punctuation characters... a total of 45 alphanumeric characters. The Baudot-Murray codes resolve this seeming paradox by the same stunt used on the classical typewriter - shift to upper case and you now have the numerical digits, the punctuations, and a bunch of other useful things like parentheses, dollar sign, number sign, "at" sign, asterisk, percent sign, ampersand, under-score. This produces a total of 64 possibilities. That's fine if you never send anything but business letters or need to talk to computers!

Different versions of the same Baudot-Murray code evolved, causing confusion in international traffic. Western Union, Bell, the Weather Bureau, the Armed Forces, the F.A.A., the Associated Press, all had their own versions of the code. The situation became problematic when subscribers couldn't get together on the same keyboard configurations. The International Telex Network used yet another version of the Baudot-Murray code called International Telegraph Alphabet Number 2, the version called out for the U.S. amateurs in Part 97 of the Commission's rules.

Although still the most widely used code in the world (the International Telex Network is still the largest of all record communications networks), Baudot-Murray code has two serious drawbacks:

o There is no parity or inherent method of validating transmission integrity; a machine has no way of telling if an error has occurred

o The code is a sequential one, meaning that a particular control character defines the following series of characters for a period of time until a new control character is recognized.

The two control characters that identify the functional configurations in Baudot-Murray code are "LETTERS" and "FIGURES". Those of you who operated RTTY in the days of electromechanical teleprinters and Teletype machines know what happened when the data was kicked into upper case by a noise hit, and how frustrating it was to have lines of unintelligible stuff.

DATA CODES

Baudot-Murray code was fine stuff back in the days when the game was communication between humans. As technology developed and machines had to start communicating with other machines without involving humans, better and more efficient codes had to be developed for transmitting information, so that the machines themselves could evaluate the received information and request repeats as needed in the event of errors being received.

As data processing began to evolve and data communication codes were developing, the data processing systems used their own codes, one of the first of these being "BCD", Binary Coded Decimal. BCD was used for internal calculations inside a data processing device. BCD has no alpha characters, only numbers, and thus was unsuitable as a communications code for use by humans.

BCDIC

Binary Coded Decimal Interchange Code was developed when the data processing systems had to communicate with humans in printed characters on a printing device. This code was fine for communication with humans, but was unsuitable for machine-to-machine communications because it lacked any form of parity or error-checking capabilities. So, BCDIC had the same problem as did Baudot - a machine couldn't tell when an error occurred in transmission.

EBCD

Extended Binary-Coded Decimal solved the parity problem when it was developed for the IBM Selectric typewriters. The Selectric principle allowed the typing and printing of hard copy while at the same time, generating a unique code suitable for transmission over a communications facility. Also known in the field as PTTC (Paper Tape Transmission Code), this code used six information bits and a parity bit which permitted the receiving system to determine if an error had occurred in a specific character. But, Extended BCD is a sequential code with upper case and lower case characters. So, while parity could detect errors and provoke repeats, the sequential nature of the code made its efficiency less than desirable.

EBCDIC

Extended Binary-Coded decimal Interchange Code was developed in 1962 and, with its 8 bits, was capable of transmitting 256 characters. But for communications, EBCDIC might be deemed

a backward step, because it had no parity capability. Some users who don't need all 256 characters have redefined the code using EBCDIC as a base and identifying particular characters with odd or even parity bits. Although there are occasional compatibility problems because of parity definitions varying between users, EBCDIC is still widely used in data processing communications systems, and is the internal data code in many IBM main frame computers and computing systems.

ASCII

ASCII was published as a standard by ANSI, the American National Standards Institute around 1963, in order to achieve some degree of compatibility for the newborn data communications field. Contrary to the beliefs held by some computerists, ASCII is an extension of the eight-bit code developed nearly fifty years ago and used for years in the Bell System TWX network. ASCII is also known as International Telegraph Alphabet Number 5, and is standardized for international traffic at various data rates.

ASCII uses seven bits to define each character and gives us a maximum of 2E7, or 128 possible combinations. We now have the ability to transmit upper-case and lower-case letters, all punctuations, 10 digits, and a variety of control codes such as "start of text", "end of text", "horizontal tab", "vertical tab", "form feed", "backspace", and many other control functions previously unavailable in Baudot-Murray code.

ASCII is frequently thought of as an eight-bit code; the eighth bit is reserved for a parity function, a form of error detection. Many ASCII systems do not require the eighth bit for parity and operate well without it.

OTHER CODES

Several other data codes are in use today, some of them dating back decades. The Hollerith Code, developed more that 80 years ago, is still used commercially and is generally associated with punched-card systems. There are others such as Jaquard Code, Moore ARQ code used in time division multiplex, six-bit Transcode, Syntoc code, AP code, and others too numerous to list here.

After many changes in radio rules, the communications operator can use many or all of these various codes, as long as they can be documented. This possibility becomes more interesting when one realizes that one of the main advantages of packet radio is that the packet network concept is really trans-parent to the user - the network doesn't care what code or data speed the user's terminal is sending to the network! The relationship between the pack-et controller (the box that makes the packets out of what you send from your terminal) and your keyboard/terminal/computer system is flexible and can meet almost any user's need, now and in the future!

THE ORIGIN OF PACKET TRANSMISSION

The concepts of packet transmission and switching appeared for the first time in this country in studies of military communications networks by Paul Baran and his co-workers at the Rand Corporation in 1964. At about the same time, several European organizations were studying and planning similar types of "distributed communications" systems.

In England, Davies, Bartlett and others at the National Physical Laboratory (NPL) proposed that a store-and-forward system using short message units called "packets" would be best able to serve interactive computers, because the computers naturally generated and received short messages. The delays inherent in store-and-forward methods would be reduced by restricting the length of the packets and using high-speed lines between the switching systems. The practical outcome of the NPL work was a local packet-switched communication network which grew in a number of years to serve about 200 user terminals and give them access to about a dozen computer services.

The Rand Corporation work was not aimed primarily at computer communication, but led to the same kind of network design that later was proposed for packet switching.

The first operational packet network in the U.S. was ARPAnet, designed to interconnect university computer centers and other centers where ARPA-funded projects were in progress. (ARPA is the Advanced Research Projects Agency of the U.S. Department of Defense.) ARPAnet used TCP/IP, a set of protocols developed by a community of researchers to allow cooperating computers to share resources across a network. (The original ARPAnet has been phased out and is being replaced by a variety of networks running the same protocols loosely referred to as "The Internet".)

In Europe, parallel work by many organizations led to the realization that standards had to be derived for international operations using packet trans- mission and switching. Packet networks had already begun operation in the U.S. (Telenet), England, Canada (Infoswitch), Switzerland (Bernet), and the German Federal Republic.

The CCITT, (International Consultative Committee on Telephone and Telegraph), an agency of the ITU (International Telecommunications Union), charged with development of recommendations and standards, tasked Study Group VII on Data Transmission, to draft a series of recommendations that would insure the uni-form development of packet transmission and switching protocols and methods. In 1976, the Plenary Session of the ITU unanimously approved CCITT Recommenda-tion X.25, "Interface Between Data Terminal Equipment (DTE) and Data Circuit Terminating Equipment (DCE) for Terminals Operating in the Packet Mode on Public Data Networks".

Recommendation X.25 stated, "the establishment in various countries of public data networks providing packet-switched data transmission services creates a need to produce standards to facilitate international interworking". X.25 was amended and expanded in 1980. X.25 refers to additional Recommendations, in-cluding X.1, X.2, X.21, X.21 bis, X.92, X.96 and other related standards. X.25 was accepted by nations signatory to the ITU treaties and was adopted by the Bell Operating Companies as Bell Standard BX.25.

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New Decade... A Lot Is Still The Same

Like all good red blooded Americans, at the start of 1990, I made a few resolutions. They had nothing to do with less eating, smoking or drinking, and were considerably more lofty. As you may have detected, I have seen a few decades come and go and this time I am old enough and I hope wise enough to see that what is needed is to be efficient and not to waste any more of valuable time. What that means in plain English is that I want to quit goofing off so much and make use of every minute. It would be nice to contribute more to my fellows and possibly even make a little money along the way.

Something that has been bothering me for a long time is the state of American industry. One resolution was to find out first hand, exactly where we are and why; so early in January, I contacted a friend who was in the flow. We discussed my resolution and being sympathetic chap, he agreed to help. Within a few days, he called back to say that it was arranged that I visit an old manufacturing company.

My host was to be the young president, who had liked the idea of showing off his plant and organization. My friend explained that this company had been founded by a man named Frederick Farley in 1882. The company was and had always been privately owned. It had always been moderately successful, carving a niche in the marketplace. My host was the great great grandson of the original founder.

It was a treat being welcomed by the head of a company employing nearly 100 people. Freddie Farley was a dapper young man who obviously had been raised properly and knew the role of a good host. Upon my arrival, Freddie greeted me in his office and this gave us an opportunity to chat about the company history. All the past company presidents were hanging on the walls of Freddie's office and it was easy to see the lineage. Most bore a considerable resemblance to Freddie. The only significant difference was the dapper dress. Freddie didn't wear knickers, but I could imagine that he would be comfortable in such an outfit.

He relayed how old Frederick had been a potter and traveled about the Eastern U. S. selling his wares. When he finally met his bride and decided to settle in one spot, it was natural for him to enter an industry that was familiar. He had never made anything before, but being very observant and a good student of the world, he began making all sorts of pots, pans and utensils. The original wares had done reasonably well, but as Frederick saw it, to reach the top you had to specialize. So from his product line, he picked the one thing that he thought would offer a growth market with very limited competition.

As Freddie explained, that is how the name "Farley's Famous Funnels"' started. The founder had put his heart, soul and money into the business. The industrial revolution was in it's infancy and by making all sorts of funnels to serve a variety of uses, the company had grown. Famous was the word added last to the company name. That was after the products became well known, and even today, everyone knows that a Farley Funnel is a fine product.

Over the years and with successive family leadership, the company had always made a living for the owners and employees. The Farley's never got rich, but apparently they lived comfortably. Once or twice along the way, management would venture from the basic product and try new items. This had always ended in failure and brought back the notion that the secret was to make the best product available; not more products.

At least that was true until Freddie came along. He was the new generation sometimes referred to as "now". He wanted to move ahead and make an impact. It was true that some of the Farley Funnels were now made of plastic, but the important ones were still metal. It was also true that the plastic funnels from Hong Kong and Taiwan were constantly undercutting Farley prices and quality. Freddie had sensed that it was time to take control.

Because of the competition that was threatening and Freddie's general desire for recognition and wealth, the engineering began. Freddie's idea, with the help of a young engineer he employed, was to make the funnel more efficient.

Freddie was sure that everyone that ever used a funnel knew that there was only a limited amount you could put through the thing in a given period of time. What Freddie and his compatriot sought was a new level of efficiency. For those on your toes, we could call this a Level 3 funnel. At any rate, it seemed like a great idea; a funnel that could handle any flow.

Within a few weeks the first prototypes began pouring from the small funnel engineering lab. There were funnels with long snouts, curved snouts, great giant cone shaped tops, completely enclosed funnels and box like contraptions with corkscrews in the snouts. It was a leap forward or so it seemed until the testing began.

The only superior funnel of the lot was one that had an output nearly the size of the input, and it was doubtful that it could even be called a funnel. Besides, as Freddie scolded his young engineer, no one could use this device anyway, since the receivers would never mate with such a shape.

It was back to the drawing board and test bench. As surely as the first batch of designs had looked so promising, and had cost so little to produce, things soon went downhill. Every test showed nearly the same result, failure; and the bills for development continued to grow. Engineering, short of destroying the simplicity of the funnel, could not make it more efficient. Every attachment added to make the funnel better, caused inefficiency itself.

The last gasp, was the engineer's brightest and most inventive effort. He added one funnel on top of another and then another on top of that. The idea, he explained was to control the flow at each layer. It worked just about like he described. Each funnel layer was the same speed; slow. In fact, the apparatus, spilled so much that it did allow more input, but the actual output was less.

It was an enjoyable day with Freddie. After explaining the debacle, he smiled and shared the rest. He had come to realize what the earlier generations had seen. The funnel is a great product and a very efficient tool in the right application; but you can't make a funnel something it is not.

What Freddie had done was to go back to basics. He set out again, as he said, "to make the best damn funnel in the business". He promoted a good work ethic among his employees, pride in their single product and personally worked hard to market his product.

Farley's Famous Funnels continued it's success. Sure there were cheap funnels and there was competition, but Freddie had a place in the market that was his.

As I left that day, I was relieved to know that American industry could indeed compete with a simple idea combined with hard work, but it bothered me all the way home that Freddie had mentioned that he might soon "go public".

BIGGEST BOOK ...

Another of my resolutions, was to pay more attention to the experts. Looking around my office, which in this publication could respectably be called a shack, are volumes and volumes of reference material on radios and computers. There is no way that I could ever read or much less assimilate all that knowledge. The resolution was not to become smarter, but to glean a few of the tidbits that must be printed on some of that paper.

To begin to satisfy my self-promise, I decided to search out the largest book of the lot. Have you guessed already? It was the ARRL Handbook. The 1989 edition, which I ordered months ago, and have only opened a couple of times, cost me $ 21.00 plus postage.

It has a hard cover, and has 39 chapters filled with information that I don't know. It would be nice to say exactly how many pages are included, but since they are not sequentially numbered, it was beyond my patience to count. In the back, in case you read it all and need more, are even ads and an order form for other books.

Don't panic. I am not suggesting that you read the whole thing. What I did was single out an interesting topic, and read about digital transmissions. As much as I fool with the stuff, I was amazed at the level of detail compiled in just one general reference work, and how many small details I either didn't know or had forgotten.

The items that were familiar and that I clearly understood easily led me to new and more detailed discussion of Amtor, ASCII, Packet and Baudot. I did not go back to check the older copies buried in the book piles, but it would be expected that a new handbook would be of benefit to anyone interested in more current information.

A NIFTY PROJECT ...

While flipping through the Handbook, one project caught my eye. On page 30 of Chapter 26 is the description of an "LSI Modem for Amateur Radio". The device which was built and tested at the ARRL labs, features the AM7910 "World Chip". This is a chip that is a complete modem and may be programmed for use with RTTY among other things. The chip functions as either a Bell 103 modem, which may be used for HF or a Bell 212 which may be used for VHF.

The project details make very interesting reading, but I did end up with a few questions at the end. Maybe that's why it is a project, so if I can ever get time, I plan to build the thing to see how it works. Just in case any of you are brave enough or have already undertaken this challenge, let me know. I would love to hook it up and give it a software whirl.

The ARRL Handbook might be the one book you want on that deserted island; assuming you could only have one book. Don't forget the resource, I'm sure you already have a copy somewhere around your house.

FOCUS ...

Just like everyone else, there never seems to be enough time to do all the things on the platter. Be it resolved to focus on the most important things. This took some time. What really is important? Operating, programming, writing, reading, and even work could find a way on the list. The conclusion in my case was to try to stay abreast of the latest and greatest.

Since I have to work for a living, I can't banter about the country attending all sorts of meetings about my hobby, so once again the ARRL came to my rescue. In the back of the Handbook and in every QST I can remember is an ad called the "ARRL Bookshelf". If you want fiction and you read things other than Digital Digest, you can try one of the 6 Tomkins' novels, such as "Murder by QRM". I don't know the plot but I think that happened to me during Sweepstakes.

My point of interest is buried at the bottom of the page, under the heading "Packet Radio/Computers". The ARRL publishes the Annual Computer Networking Conference Papers. Listed recently were 1 through 7 and number 8 should soon be available.

The 8th annual ARRL Computer Networking Conference was held last October 7th, in Colorado Springs at the US Air Force Academy. The conference was sponsored by Tucson Amateur Packet Radio (TAPR), Academy Amateur Radio Club, USAFA Cadet Radio Club, Rocky Mountain Packet Radio Association (RMPRA) and the American Radio Relay League (ARRL).

It was reported that most people thought the conference was the best network conference yet. In attendance were about 150 amateurs from across the country and the world. Amateurs from the Netherlands, Costa Rico, Italy, England, Australia, Sweden, and Mexico were in there.

Topics discussed included HF packet, Networking, Application & Users, High Speed Packet, Satellites, and other general packet papers. This annual meeting is filled with the latest attempts to improve digital communication.

Looking back over the years, some of the items proposed at this conference have never made it, but others that started out as just an idea have made the big time. If you can't attend the conference and if you want some detailed reading spend a few bucks. If you want to keep it light, try "DX Brings Danger".

YOU COULD GUESS ...

Luck has been with me over the years. I don't have ulcers, heart trouble, and about the only real battle I fight is gaining weight. Perhaps the reason is the annual resolution, restated for 1990, to not get all worked up and to find a little humor in all the serious matters that I encounter. Tongue in cheek, is not a bad thing for the ticker or the stomach. It's not too late to add that to your list.

SO WHAT ...

The man asked "what about all those other resolutions?" My reply was simple. "That's all". As I stated, I am wiser this decade than last and kept the resolutions to the achievable, although I did err just a little. One goal was to write this entire article without using the words "I" and "me".

by Mike Bryce, WB8VGE
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It's Not What You May Think!

Perhaps one of the biggest problems with QRP operation lays within our thinking. Mention QRP to a group of hams, and you'll get ideas of running CW on less than perfect radio equipment. When in fact, QRP simply means operation with the minimum amount of power needed to maintain communications.

When adding the digital techniques we have at our finger tips, QRP operation becomes a totally new ball game. A very good result of both QRP and digital systems can be seen by using a hand-held radio with a TNC. A popular lap computer such as the Tandy Model 100 or 102 hitched to a micro powered TNC will allow portable, emergency, and light-weight QRP Packet operation. Add a small photovoltaic panel and you have, well, the cutting edge of portable, error free communications. Why a two meter hand-held, a micro TNC and portable computer would yield a cornucopia of ideas. Or how about this, a worst-case scenario?

Nothing brings people together better or quicker than a shared disaster, and if you are prepared well enough to reduce hardship to inconvenience, the disaster may well provide you with friendships and fond memories that last a lifetime. The key ingredients is preparation! Consider this scenario:

A major earthquake has just hit the southern part of California. The quake measured 7.8. You are a member of ARES and have been assigned to a Red Cross team. Your job? To set up emergency communications for the Red Cross in a small town hit especially hard by the quake. Reports are coming out of the area of severe injuries and several deaths. The Red Cross is badly needed and communications will be a obvious priority.

Because the town sits in a valley, and surrounded by mountains, all equipment will be hauled in by Jeep. You and three members of the Red Cross have been riding for sometime, when the roads become amiss. The transfer case of the Jeep begins to moan from the stress of crawling over downed tree limps and boulders skewed on the road. As a group, you decide to hike in by foot the last four miles. You take what you can carry, being sure to bring along water, and medical kits for the injured in town.

Several hours pass, and you're finally reached your destination. Just as the reports of severe damage noted, nothing much is left of the town's main street. All power, water, and phone lines are out. Because of the location of the town and the mountains that surround it, the use of UHF phone frequencies will be of little help. Also, the only repeater on the hill side was knocked out of commission from the quake.

As the Red Cross members gather together details of what will be needed, you're busy getting communications up and running. You open your back pack and pull out the following: Micro powered TNC, lap top computer, collapseable antennas, nickel-hydroxide battery pack, 30 watt Sovonic photovoltaic panel and a small five watt multi-mode radio. You unfold the PV panel and connect up the gear. Pointing the antenna to the horizon, you hear the reassuring brarrap coming from a Microsat. Within minutes, you're on the air passing emergency communications.

Well lets hope this never happens, but then again, look at just last fall. Both sides of the country were hit with disaster. When the "big one" hits, we as hams won't be doing communications with brass keys. Highly portable low power high speed digital communications will be required to get the job done. In the above scenario, all the equipment is available to us now. Nope not science fiction, but rather science fact. The only problem I see in the scenario? How many of us are up to a four mile hike with a back pack on in less than ideal conditions?

There is an old expression that if you have to choose between gold and guns, choose guns, because, in the end, the person who has the guns will have the gold. I'm not sure that is at all accurate! The person who has good communication will end up having all the gold, silver, guns, food, water and everything else they want. Remember, low power is always better than no power. In the above scenario, the key to the whole project was low powered portable high speed digital communications! Nothing else will do.

Operating QRP requires the absolute best in antennas. Nothing else will do. Even in my scenario, the use of a directional antenna is a key componet. Also, note the use of a multi-mode radio. In case on mode fails, you can always try another. The key again is allowing for change when using low power. Our packet station might not have worked because of the mountains blocking our signal, so we could have tried AMTOR next.

Low power operation allows the use of photovoltaic panels for power. Small energy requirements are very important when using portable equipment You just can't take a 930 in the woods, without a KW worth of gasoline generator.

Of course, one should not wait until a disaster hits to try out the gear, that is one reason for Field Day. Next time we meet, I'll have some thoughts on powering QRP equipment in the field.

ATTENTION QRPpers! Ten-Tec To Release Long-Awaited Argonaut II...

The QRP community will likely find a dream come true at Dayton 1990, when Ten-Tec unveils the latest in its series of small, low-power transceivers. The five-watt Argonaut II will bring QRP into the computer age, with microprocessor-controlled frequency synthesis, dual VFOs, at least 25 memories, FM option and a 100 kHz - 30 MHz general coverage "...world class" receiver. The $900 (target) list HF 160-10 meter unit uses liquid-crystal display for low energy consumption, and measures approximately 9.5"w x 3.25"h x 10"d.

"We don't want to show a prototype at Dayton," according to Sid Kitrell/W0LYM, VP of Marketing. "We want to have full production units available for sale." Kitrell said that Ten-Tec made an effort to contact all the "top QRP gurus" for input on design of the product.

Ten-Tec manufactures tool and die products and electronic equipment enclosures as well as ham gear. "We remained in the ham business because our founders were stubborn," according to Kitrell. He said that since the escalation of the yen, Ten-Tec has invested a "big pile" of research and development dollars in ham radio: "The profit opportunity has returned. The business will be a good business once again." He added that more new product announcements from his company are in the works for 1990.

Source: W5YI Report

Aries-2™ joins Aries-1™ as another multi-tasking Amateur Radio Program available from Ashton ITC

The new program, like Aries-1 ties together multi-mode Terminal Units, computer capable Transceivers, and a real time logging function. In addition to reading data (Frequency and Mode) from Transceivers, however, Aries-1 adds computer control of these units and supports most rigs manufactured by Icom, Kenwood, Ten-Tec and Yaesu. This control includes the unique ability to do a timed Log Scan (while optionally recording scanned TU input) based on Aries-2 search capabilities.

Both programs control AEA PK-232 and Kantronics KAM Terminal Units with simple key presses and mouse clicks. For example, pressing the up or down arrow on the keyboard increases or decreases CW speed and RTTY baud rates. You can use replaceable string parameters within pre-written text files. Log entries such as Name, City, Report, etc., may be automatically pulled from the on-line log and inserted into an existing text file during real-time transmission thru the Terminal Unit. Aries-2 will allow any other smart (command driven-RS-232 capable) Terminal Unit to be used in a new "Terminal Mode" along with Transceiver control. Both allow simultaneous display of the TU's input/output on the same screen with access to the Logbook.

The electronic Logbook in both products feature fast data search capability along with automatic entry of date and time from the computer's clock. Frequency and mode are also automatically entered into the log when using a compatible transceiver. By clicking on an optional mouse on the appropriate log entry, other data such as Station ID, City, State/Country, Name, etc., may be entered into the log from data received thru a Terminal Unit without the need to re-type the information. Aries-2 supports Log files limited in size only by available disk space. Aries-1 on the other hand is limited to approximately 1800 contacts per Log file.

Although designed for everyday use, both products support a Contest Mode which offers instant dupe checking. Displayed dupe information in this mode includes Frequency, transmission type, date/time, RST and contest exchange of each previous contact. Extremely fast contest exchanges are possible, especially in digital modes. For example, a CW or RTTY exchange that required RST, Time and or a progressive contest number can be exchanged with another station and simultaneously logged (with date, time, frequency, mode and contest exchange automatically inserted) by pressing just three keys.

Features common to both programs include the ability to run other software while staying resident in memory (great for Satellite Tracking, Beam Heading, Gray Line programs, etc.). A capture buffer allows for selectively saving a disk input/output data from a Terminal Unit. You can search and print Logs by band, mode, country, etc. Aries-2 adds the ability to sort Logs (by date, prefix or country). With both products you can print QSL labels, update QSO information within the Log, upload and download files thru Packet, RTTY etc. plus much, much more.

Both programs include sample message files, a demo-log and printed User's Guide. They are available on 5-1/4" or 3-1/2" disks and run on IBM PC / XT / AT / PS-2's or compatibles with at least 256K of memory. For Aries-2, we suggest a minimum of 640K memory and a Hard Disk drive. A serial port is required for connection to a compatible Terminal Unit or Transceiver. A second serial port is necessary if the user desires simultaneous interface to both units. An optional mouse (Microsoft bus version recommended) is also supported for even faster TU control and data entry. The Transceiver manufacturer's Radio to RS-232 interface adapters are required. The user price for Aries-2 is $89.95; for Aries-1 $64.95, plus shipping and handling. For further details, contact Ashton ITC, PO Box 1067, Vestal, NY 13851 or call: 607-748-9028

Software Piracy Hurts Everyone! ...

Most people who purchase a program would not consider freely giving it to another, after all they paid for it why shouldn't the next person. Yet these same people will loan (or allow themselves to be pressured into loaning) a copy of the program to a friend. ..."Gee look at this neat program I bought...here is a copy for you to try...if you like it you can buy it from so and so"... Now this friend has not purchased the program, and may not have the same ethics as the one who did. The latter user rarely will actually buy the program and what's worse, since the perceived value at this point is the cost of a floppy disk (it cost this user that or less) there is no real value associated with the work and so it is freely passed on and on and on...

Because the process of making a copy of a program (or data) is such an easy and quick thing to do with a computer, few people appreciate the tremendous amount of talent and sweat that were necessary to create the program in the first place. After all, if a blank diskette costs a dollar or less and the time to make a copy of the data on one disk to another is measured in seconds, what could it be worth.

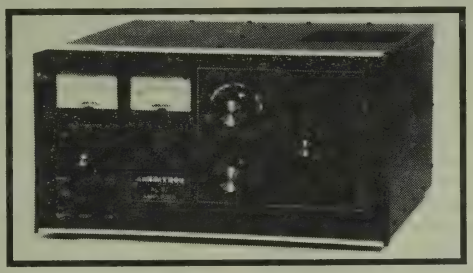
Few people see it this way but the copy-ing of a program and giving it to another is theft. It is theft because it denies the author any compensation for the use of the program. As bad as this is, a far worse crime is committed when someone actu-ally copies a program for distribution. Whether the copied program is kept intact, disassembled and/or modified and whether it is distributed as share-ware, freeware or for profit makes little difference. Not only are people being robed but the individuals distributing the program have done nothing to further the state of the art. If we are going to remedy this problem it is imperative that we real-ize that a crime is being committed and that something must be done to stop these crimes. The legitimate user (purchaser) of the software also loses out. Many companies in the software field who pride them-selves in good support to their clients are being put in a position where they can no longer afford to do this or worse yet are forced out of business by declining rev-enues due to illegal copying.

A program, especially one that performs a lot of complex functions can take many man years to bring to market. There is the cost of labor, computers and peripheral equipment, language compilers and other software tools, printing expenses, raw materials, shipping, telephone, mar-keting and advertising. If the publisher is an actual software development firm add additional labor, employee benefits, training, rent, insurance, legal and accounting expenses, etc. Often over-looked is the creative aspect of a pro-gram. Someone had to perceive the need for the program in the first place and then design it to fulfill those needs. Who was it that said "The way to riches is to find a need and fill it". Think about how copy-ing robs the authors of the just deserts accorded to other innovative

(cont'd on page 24)

Ameritron...

famous for manufacturing outstanding quality RF amplifiers announces the release of the new AL-82 full legal power linear amplifier with (2) 3-500Z transmitting tubes.



According to Ameritron, competing amplifiers cannot deliver full legal power on all modes because they do not use heavy enough power transformers to drive the 3-500Z tubes to optimum output. The AL-82 corrects this problem with an 1800 watt continuous rated hypersil transformer, standard along with heavy duty rectifiers in a full wave bridge supply with computer grade capacitors.

Other features of the AL-82 are dual illuminated meters. The Grid Current meter gives a constant reading of grid current, the most reliable indicator of overall amplifier performance. The multimeter displays plate voltage, plate current, peak RF output power and drive power/ALC.

Two bias settings allow either RTTY and CW operation at 1500 watts of continuous output at nearly 70% plate efficiency or low distortion 1500 watt PEP SSB, SSTV, or AM output.

Silver plated tank components provide high efficiency operation above 20 meters. THe Pi-L circuit permits full impedance matching over the entire 160 meter band. The tuning capacitors and bandswitch have a 35% safety factor to virtually eliminate tank circuit component failure, even under adverse operating conditions.

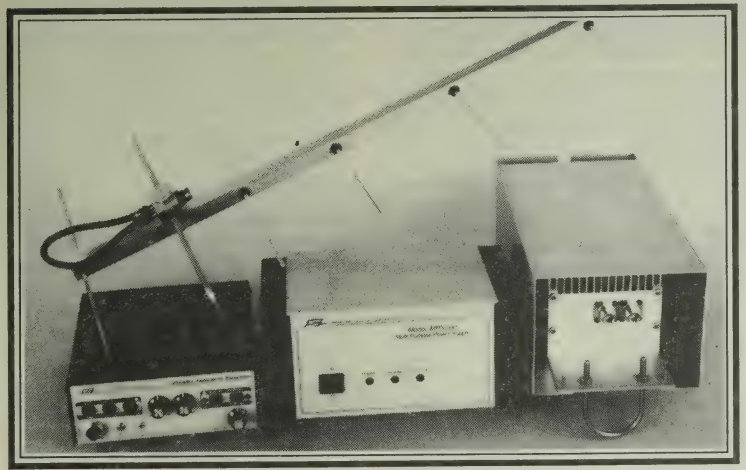
The cooling system keeps the components and 3-500Z tubes safely below the manufacturer's ratings, even while operating continuously at 1500 watts output with a steady carrier. The filament supply has inrush current limiting to insure maximum tube life.

Complete shielding and by-passing helps prevent TVI and RFI at the higher power levels developed in the AL-82.

The AL-82 covers 160, 80, 40, 20, and 15 meters and gives 80% rated output on 12 and 17 meters. In addition, it can be modified to cover 10 meters upon presentation of a proper amateur radio license. An export model is also available.

Suggested retail price of the AL-82 is $1995.00.

To order, contact any Ameritron dealer. For more information contact Ameritron, 921 Louisville Rd., Starkville, MS 39759, or call (601) 323-9715.



AEA...

introduces a complete Amateur Television (ATV) system which includes the new and improved FSTV-430A transceiver, LA-430/50 linear amplifier with MPS-100 power supply, and 430-16 antenna. Technician class or above amateur radio operators can now enjoy Fast-Scan TV (FSTV) that rivals broadcast television quality. Transmit and receive live or taped full color video and crisp audio.

Basic components of the ATV system are the FSTV-430A transceiver and 430-16 antenna. The FSTV-430A simply connects to a video camera or camcorder, a standard TV set and the 430-16 430 MHz antenna.

The newly designed FSTV-430A transceiver features a low-noise UHF GaAsFET preamp with a typical low noise figure of less than 1.5dB and a crystal or variable tuning down converter. Output is available on channel 3 or 4 for signal reception and monitoring transmissions. Two frequencies can be selected from the front panel for transmission (one crystal is included with the unit). The new design is also optimized for superior video and audio quality without sync buzz even with weak signals.

The 430-16 antenna is a high-performance 16-element, 10-foot boom computer-optimized from 420 to 440 MHz, 14.3dB gain, O-ring sealed connectors, 28 degree E plane and 32 degree H Plane beam widths.

To give a boost to ATV signals, AEA also offers a 50 watt P.E.P. mast-mounted Linear Amplifier (patent pending) covering 420 to 450 MHz and a GaAsFET preamp which utilize the antenna feedline for DC power. The mast-mount eliminates the line loss between the amplifier/preamplifier and the antenna to improve both transmission and reception. It's the equivalent of a 100 watt amplifier in the shack with 55 feet of RG-8 coax with a 3 dB line loss or a 200 watt amplifier with 110 feet of RG-8 coax. The amplifier is housed in a weather resistant alodized aluminum case. The MPS-100 power supply for the LA-430/50 also provides a regulated 13.6 volt output for the FSTV-430A. This remote amplifier/preamplifier unit is also an excellent choice for OSCAR satellite work.

For more information and pricing, see your local AEA dealer or contact AEA direct: 2006-196th St., SW, Lynnwood, WA 98036 / Phone: (206) 775-7373

by Jim Mulvey, KS1A
60 Serenity Dr., Tewksbury, MA 01876

Getting On Packet, Remotely From Work

It's easier than you think to call your home from work and check out what's happening on Packet. Every day around lunchtime from my work in Boston, I make a quick phone call to my home computer 20 miles to the north, and fire up the TNC on Packet! It helps to break up the day checking on recent DX spottings, the forecasts from WWV, the mail, who's received the latest QSLs and what the locals have been doing today.!

Packet is a whole new ball game today! And there are lots of reasons to be in it.

I was not impressed when I got my first TNC back in 1985. It was an interesting technology but there weren't many bulletin boards (PBBS) and trying to have a QSO with another packet station took forever. But, soon the local packet bulletin boards developed into first class operations. I like checking them daily for bulletins and the latest happenings in amateur radio. We even send our club newsletter articles to the club editor thru the local Packet BBS. And sending a ham Radiogram or mail message to someone else in the country is getting better and better on packet. When the amazing DX spotting nets came along it completely hooked me on packet. By simply connecting to the cluster I join hundreds of other DXers who are scanning the bands for something interesting. All through the day when hot stations are spotted on the bands they are posted on the board. Sometimes a new spot even comes up every minute or so! Within a short time my band-countries total went up by over a hundred. The DX spotting cluster also posts the current WWV forecasts, questions and instant answers, and maintains a detailed QSL manager list. Is this reason enough why you should be on packet? Now you can do it from work as well as home.

To run your home packet station remotely from work you'll need some specific things. Nothing's out of the ordinary, and if you're a digital person you already own a computer and a VHF rig. If not, you may want to! So here's the plan:

*** The following is my setup. If you have a different computer or TNC don't say, "this one's not for me." Your equipment should work just as well!

WHAT YOU NEED: THE SETUP AT HOME

I started with my PC-clone computer. I plugged my Kantronics KAM TNC into my 2-meter base station and into the computer's COM PORT1. On the computer's COM PORT2 I hooked a regular auto-answer telephone modem. (Keep reading for the software!)

WHAT YOU NEED: THE SETUP AT WORK.

A computer with a modem.

All you need to make it work is the right software. AND HERE'S WHERE I FLOUNDERED FOR ABOUT TWO MONTHS. I needed software that would allow me to call home from work to the computer. That was simple enough as a hundred communications programs do that. But once into the computer via telephone modem on COM PORT1, to do packet I would need to address the TNC on COM PORT2. I tried some excellent shareware communications programs like QMODEM(c) with it's "SHELL TO DOS" commands. With "SHELL TO DOS" you can get into your computer and do basic things that don't take up a lot of memory. However my "getting on packet from work" application was stretching the various program's designs and for one reason or another it wasn't quite right.

TWO WAYS TO DO IT: FIRST, THE EXPENSIVE WAY:

FINALLY the software that worked for me was (drum roll please): PC ANYWHERE III© distributed by EKD COMPUTER CORP, 770 Middle Country Rd., Selden, NY, 11784. I think it cost me about $110 at a Boston discount software store. PC ANYWHERE III lets you call your PC (or compatible) at home from any PC or compatible, Macintosh or Apple II at your place of work and have total control. It was the key to remotely controlling my home packet setup from work!

Now, everyday at lunchtime I fire up PC ANYWHERE III on my work computer and telephone home to the waiting modem. The waiting modem at home answers the call and brings up my computer through com port2. Once connected, PC ANYWHERE III gives me complete control of my home PC! I can turn on the home printer, re-boot the home computer, check my FAX board for FAXes, check the Complete Answering Machine(c) for messages, or anything else I'd like. After business is over I call up the HAM directory and run KANTERM© to access the KAM TNC on COM PORT1. AND I'M ON PACKET!!!!!!!

It's a terrific way to keep in touch with the amateur world during the day. Recently, there's been quite a bit of talk on Compuserve asking about how to do get on packet remotely.

Even though you could use this setup to control your HF station the FCC does not allow unattended HF transmission. For receiving though, it's terrific. I hook up my hf rig to the computer and let the amazing ARIES-2© software from ASHTON ITC change frequencies up and down the band! It makes a great way to remotely tune in RTTY stations and show people at work what all this stuff is all about.

THE GANG IS SURPRISED to see me on the local 2-meter spotting net when they know I'm away on business. It sure makes those long hotel stays a lot easier to take when I kick off my shoes at night and fire up the laptop from my room. Every hotel has the same SPECTRAVISON movies so you welcome the chance to unwind with the local ham gang back home.

SECOND WAY TO DO IT: THE LESS EXPENSIVE WAY:

One day while at work and remotely reading the packet mail I saw a message talking about Dan Babin K5KQG's remote system! So from work I dropped him an SASE and got a quick reply. Dan offers his own system for remote control of your TNC in a package called CABLE RADIO(c). Although I have yet to test it, it looks very smart! Dan says that using AEA's PK-232, Kantronics' KAM, MFJ's 1270 or any TNC with a standard RS-232 port will work. He says you can use CABLE RADIO:

1) For emergency communications, control your base station from AMERICAN RED CROSS office.

2) Your weekend lake/mountain cottage has an antenna farm with complete ham station, but due to antenna restrictions your home site has none. Now, control via telephone your cottage station from HOME or OFFICE or even a telephone booth.

3) Your home base station is located upstairs where it is very HOT during the summer months. Why not use your laptop to do hamming in the downstairs

den where it is COOL, and visit the XYL at the same time.

4) Remote control your packet digi!

Dan sells the instructions on how to do-it-yourself. Or, you can buy the CR-1 and CABLE prewired for only $17.50. Drop him an SASE for info on CABLE RADIO© to POB 2801, Sherman, TX 75091. (214-893-5868)

TO ME, adding the ol' computer to amateur radio is incredibly exciting! The tools have been there. Now it's up to us to find new applications for them. One application being INTERNET! This is a way to send E-MAIL from business to business from company to company AND NOW, TO PACKET! With INTERNET a friend working at WANG or DIGITAL can send me a friendly message from their desktop computer. The amazing part is that by the time it reaches me it's carried from gateway to gateway through various companies... state to state... through university computer nodes and out onto Compuserve or a distant PACKET station... which relays it to my local PBBS... and finally to my own PACKET MAILBOX which I will check by calling my home computer over telephone lines from work! When the INTERNET message arrives it often contains a full PAGE AND A HALF of all the places, nodes, states and businesses it was routed through to get to me.

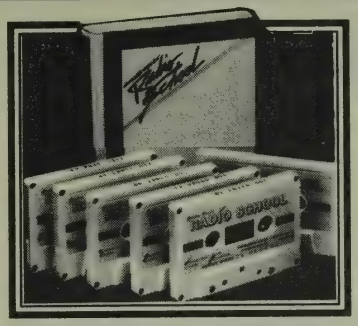
It's a new decade of amateur technology and more importantly, new applications for the technology! Save this issue of Digital Digest as the first of the 1990's, and read it again in ten years: January/February of 2000. Whatever the next step is, you're reading the publication that will cover it!

New 10 Meter BBS...

At this writing there should be an experimental software-exchange BBS operating on 10 meters at 1200 baud. It will be located precisely at 28.199.00 MHz. The BBS will be for exchanging programs with other hams. There is a directory for Commodore, IBM and the CoCo type computers. It is open to all users, so feel free to use it as often as you like. There is no message forwarding capability.

The system is the KG5BH PBBS, located in northeast Texas. Any questions or comments (good or bad), are welcome and should be directed to Mike Simms, KG5BH.

Source: CFPUG Newsletter



New "Fast Code" Test Prep Tapes for ARRL Exams...

Gordon West announces the availability of new Morse code test preparation tapes specifically designed for the new ARRL "Fast Code" CW examinations. Code characters are generated at 18 wpm and spaced for the 5 wpm ARRL Novice tests, and the 13 wpm ARRL General tests.

"Our new series of popular test preparation tapes are a perfect match to the new ARRL "Fast Code" CW exams at 18 wpm character speed," comments Gordon West, WB6NOA, well-known instructor and writer.

"Two separate tapes are available... CW test preparation exams for Novice class, and another tape with CW examinations for General class. I narrate these tapes with helpful hints to the applicant on how to prepare for the new ARRL "Fast Code" CW tests, or the more traditional (and more common) Farnsworth style code tests with a character rate of 14-1/2 wpm for the Novice and General class character speeds," adds West.

West still voices concern that there are 2 different code examination styles that may cause students to shop around for a more traditional-speed code test. However, the ARRL claims 18 wpm character speed is a better way to learn the code.

The new code test preparation tapes now feature examinations at both code rates.

Radio School tapes are now distributed by The Radio Amateur Callbook, Inc., PO Box 247, Lake Bluff, Illinois 60044; Ph# 312-234-6600, and are available through most major amateur radio dealers.

DX LOG

As a contester, DXing offers a competitive activity to pursue between contests. Chasing DXCC and collecting QSL cards is fun, but not something I am willing to spend hours on doing the recordkeeping. I tried several methods to keep up with DXCC records but none of them really made the job any easier. I needed a program that would let the computer do all the dirty work and require a minimum amount of effort to keep updated.

DXLOG is a software package which turns your IBM PC (or compatible) computer into a DXCC data base manager. It can handle logging, printing QSLs, need list and status reports, notification when a new DXCC or WAX award level is reached and production of the DXCC and WAZ submission forms. The team behind PAYL Software knows DXing, and the program certainly gets the job done.

Starting Up

The software is easy to install and will run on a computer with 512k RAM and two 5.25-inch floppy disks, or one 3.5-inch floppy, or a hard disk. All monitor options are supported. I used an old IBM-PC/XT with a hard disk and monochrome graphics to test the newly released Version 1.3.

DXLOG is copy protected in a way which protects the manufacturer without inconveniencing the legitimate user. Each copy is customized with the purchaser's call. All screens and printouts contain the purchaser's call and the program file name contains the last two letters of the call. To run my copy of DXLOG, I type ZDLOG. You can make as many backup copies of the software as you want. If someone should distribute unauthorized copies, they will be easily traceable back to the original purchaser. Software costs time and money to develop - this protection method rates an A-plus.

After loading the software to the hard disk, I was ready to start. Typing ZDLOG for the first time brings up screens for entry of basic data such as name, address, calls used, DXCC and WAZ award information, etc. This took about two minutes to complete.

Every data base program has one time-consuming function - the initial data entry. I began by entering QSO data for all of my QSL cards previously submitted for DXCC. This takes awhile depending on how far you have progressed. It took me about four hours to get everything entered (300 QSLs).

Data entry is kept as painless as possible. Typing the call fills in the country and zone fields (you can override the defaults easily). Then, just enter the date, time, report and other optional information (eg confirmed, QSL manager, etc.).

The next step is to do a DXCC submission which will update all the records in the data base as being confirmed for the selected awards. I double checked the DXCC submission listing with my DXCC records so that there were no mistakes (this is important). This step took about two hours.

The data base was now current with my DXCC records on file at the ARRL. The next step depends on the user. You can enter new QSLs received or log book entries which you wish to track. You can have DXLOG check to see if you are eligible for any new DXCC award levels at any time. A report is available which lists the worked/confirmed status of all countries. It makes a convenient check sheet to keep on the operating table for chasing band countries.

The editing features are very easy. A QSO can be called up by prefix or call. A full screen editor is available for each record. Adding a new DXCC country is easy as well. This is especially useful now that DXCC resembles the Islands on the Air award. It also allows the user to keep the data base up to date without new disks from PAYL. In about 6-8 hours I had most of what I personally needed in a DXCC recordkeeping program.

Operation

DXLOG is designed to be used "off line" and is oriented toward after-the-fact data entry. Work the DX first and worry about entering it into the computer later! This means you can borrow a computer (from your office perhaps) and run DXLOG at your convenience.

I am now using DXLOG in two ways. As new QSLs arrive, I sort through them looking for ones that might be new band or mode counters. DXLOG has a feature called Quick Check that is perfect for this. From DOS, typing ZDLOG <prefix> displays a screen of all QSOs in the data base for that country. From inside DXLOG, there is a menu choice for Quick Check which does the same thing. If the card is not needed it goes into a shoe box. If it is new, I go into the data entry mode and enter the QSO information. It takes only seconds to check a prefix and only a minute to enter a QSO/QSL.

DXLOG is also useful as an outgoing QSL manager. I went back through two years of general operating and DX contest log books and entered the QSO data of needed countries. Then, I used the QSL label function to print labels for the unconfirmed QSOs. A little time and some SASEs had outbound QSLs on their way that I would have missed or forgotten otherwise. As the confirmations come back in, it is only necessary to edit the QSO record and show it as confirmed.

It is also possible to print out a "log book" of the QSOs entered in the data base. This makes it possible to log all of your QSOs using DXLOG. However, this might slow the program operation down as the number of records expands into the thousands. Using two 5.25-inch disks, the database size is limited to about 1500 QSOs. Using a hard disk, the number of QSOs is limited only by the disk space available.

There is one problem using DXLOG for new DXCC submissions- and it is not the fault of PAYL Software. The ARRL DXCC desk only accepts form MCS-253 (the two-page country list foldout) for first time applications. This just means you have to hand copy the information from the DXLOG print out onto the ARRL form.

(cont'd on next page)

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For DXCC endorsements, the forms produced by DXLOG are fine and you need only fill in the amount for return postage, enclose the QSLs, sign and mail. Submissions for the Worked All Zones award may be made directly from the DXLOG forms.

Summary

DXLOG does a great job of handling a very time consuming and somewhat complex task. As with all great software, it makes the computer do as much as possible to unburden the operator. You don't have to know anything about computers or programming to make it work. All screens are menu driven. The manual is very well written and complete.

PAYL Software does offer data base conversion for those who have their DXCC records on some other program or format. Write to them for details.

Everyone always wants one feature that a software package doesn't have. For me, it would be the ability to extract QSO information of new DXCC countries from the K1EA logging software. Let the computer do the work of searching through the contest log and counting the new ones!

There are a lot of Amateur Radio software programs on the market. Some are much better than others, but there is rarely a way to tell the difference before buying. PAYL Software has prepared a full feature DXLOG demonstration disk. It allows only 25 QSOs of data, but that is more than enough to see if the package will do what you need. If you decide to buy, the data entry you did for the demo disk can be directly imported into the full package. A nice touch.

I recommend DXLOG for anyone looking for help with DXCC, 5BDXCC, WAZ or 5BWAZ recordkeeping. When you consider the number of hours you spend to work all those countries, and the pride you have in reaching each new DXCC award level, DXLOG offers a superior value.

DXLOG is available for $39.95 from PAYL Software, P.O. Box 926, Levittown, PA 19057. Phone (215) 945-4404.

by Randall A. Thompson, K5ZD/3

Reprinted from NCJ: The National Contest Journal

Is It Time To Renew!

Be sure to check your mailing label for your subscription's expiration date. Expiration is indicated by the digits to the right of your name by YEAR-ISSUE#. Issues are numbered 1 thru 6 and relates to the publication as follows:

(1) Jan/Feb, **(2)** Mar/Apr, **(3)** May/Jun, **(4)** Jul/Aug, **(5)** Sep/Oct, **(6)** Nov/Dec.

Example: If your mailing label has the digits "90-1", your subscription will expire in 1990 with the Jan/Feb issue. To insure uninterrupted service, please be sure to mail in your renewal before the mailing of the next issue (approx. the 25th of the first month's issue date - ex: Mar/Apr is mailed on or about the 25th of March.

by **Stan Horzepa, WA1LOU**
75 Kreger Drive • Wolcott, CT 06716

New Column For MacHams

Welcome to MacHamWorld! In each installment of this column, I will present what is going on in the Apple Macintosh world as it is related to Amateur Radio. I will discuss what is new in Macintosh ham radio hardware and software. I will also review hardware and software. I will discuss the various Amateur Radio applications that are being performed with Macintosh computers and I will present tips on how to better use a Macintosh computer in the Amateur Radio world.

Turn on the Brag Tape

I own a Macintosh SE with 4 Mbyte of RAM and an internal 20 Mbyte hard disk. External to the Mac is an 80 Mbyte hard disk and a LaserWriter II NT laser printer. The SE is my second Macintosh computer. I previously owned one of the original Macintosh "128" (for 128 kbyte of RAM) computers, which I purchased in 1985 and eventually upgraded to 512 kbyte of RAM, so you know I've been at the Mac for a while.

On the RF end of the shack, I have transmitting capability for every ham band from 160 meters to 450 MHz and I have continuous reception of everything between 100 kHz and 2 GHz. On the digital end, I own four TNCs and one multimode controller.

My Favorite Things

My mode of operation is packet radio. I do 220-MHz FM in the car as I commute back and forth from work each day and occasionally I do 10-meter SSB at home when I am so moved, but nearly everyday I do packet radio. You know what they say, "An apple a day keeps the doctor away." And I follow that precept religiously by going down to the shack after dinner and powering up my Apple Macintosh computer to do some packet radio. Not logging onto the local PBBS each evening is like starting the day without a cup of coffee or not checking out what Vanna is wearing on Wheel of Fortune.

This has been going on for a number of years and over those years, Vanna keeps looking better and I have tried out a variety of communication programs on my Macintosh to do packet radio. Because of the limited amount of ham radio software that is available for the Mac, especially in the past, most of the stuff I tried out was software intended for landline data communications. I tried MacTEP, MacTerminal, Straight Talk, Smartcom II and Red Ryder. They were all adequate, but nothing to write home about. Then Jack Brindle, WA4FIB, came out with MacPacket, a Macintosh data communications program specifically designed for amateur packet radio. I was in seventh heaven! I extolled the virtues of MacPacket in *QST* back in October 1985 (on page 64, to be specific) and I used the program for quite a while. The problem with MacPacket was that after a few upgrades, no additional upgrades were forthcoming and I outgrew the program.

A lot of Mac hams told me that they were happy using Red Ryder on packet radio. Red Ryder, one of the grandaddies of Macintosh shareware, had gone through a number of reincarnations since the last time I tried it, so after I grew tired of MacPacket, I downloaded the latest version of Red Ryder from GEnie and gave it a workout. Although Red Ryder was intended for landline data communications, it had a very powerful built-in programming language that allowed you to write procedures to optimize the program for specific applications. For example, in my sleep I wrote a procedure that read the date and time from the Macintosh's built-in clock and used that information to automatically set the time and date in my TNC each time I used Red Ryder for packet radio. Other procedures were written by other hams and they were passed around the Mac packet-radio community. I obtained copies of those procedures and turned Red Ryder into a real TNC communicator. I was in seventh heaven again and I happily sent in my shareware fee.

Then one day, out of the blue, Steve Fine, WD8PUH, sent me a copy of a new program he had just written. It was called Macket, a packet-radio terminal program that took up where MacPacket had left off. After using Macket for a few minutes, I almost never touched Red Ryder again (my glowing review of Macket appeared in the June 10, 1988 issue of *Gateway: The ARRL Packet-Radio Newsletter).*

One of the nicest features of Macket was that it allowed you to do packet radio without the need to know the confounding TAPR TNC-1 and/or TNC-2 command set. Everything you wanted to do could be done by pulling down a program menu, and pointing and clicking with the Macintosh mouse. Built-in macros provide you with the ability to perform any task (repetitive tasks, complicated tasks, etc.) effortlessly. Instead of wasting time communicating with your TNC, Macket allowed you to communicate with the packet-radio world that existed beyond. The program had one annoying quirk or "feature" that drove me crazy, but despite that, I was in seventh heaven for the third time.

Let me tell you about the feature that drove me crazy. The program has windows, lots of windows: a window for the data you are sending to another station, a window for the data you are receiving from the station you are connected to, and in a multiconnect situation, windows for each station you are connected to, a window that monitors other activity on the channel while you are connected, and on and on and on. The windows that display received data are scrollable, i.e., you can scroll the windows to display previously displayed data that has already scrolled off the screen. The problem was that if data was received in a window while you were scrolling through that window's previously displayed data, the window would jump to the last line of the display in order to display the just received packet.

This was very disconcerting. You just scrolled through an hour of previously displayed packets to read a message from Hiram Percy and just when you find Hiram's message, the display jumps to the last line of the window. There was a command that would hold all received packets so that you could scroll without being interrupted, but most of the time I forgot to use it and would have to restart the scroll with the command enabled. This was a minor quirk and, in my mind, was the only thing that prevented Macket from being perfect.

Last April, I was tramping around the Dayton Hamvention and ran into WD8PUH demonstrating software on a Macintosh computer at the AEA booth. "Hi Steve... whatcha got there?" Steve explained that he was demonstrating MacRATT with FAX and asked if would I like to try it out. He didn't have to ask. I could feel seventh heaven coming for the fourth time. And in the mail it came, when few weeks later, the kind folks at AEA sent me a copy of the software. Basically, MacRATT with FAX is a new version of Macket that has been optimized for operation with all of the modes supported by the AEA PK-232 multimode controller including, as its name implies, facsimile.

After spending a few days with the program, I discovered that MacRATT is perfect! The quirk that made Macket just less than perfect was gone. Now, I can scroll all day long and not have to worry about losing my place. And, although MacRATT is now an AEA product, it works just as well doing packet radio with all of the non-AEA TNCs that I own. WD8PUH has done a very fine job with MacRATT. I wonder how he is going to top it (and I wonder if seventh heaven is possible seven times).

A Mailman's Man

As anyone who knows me will tell you, I love mail. So, if you have any complaints, suggestions, ideas, software, opinions, tips, etc. that you think I should look at, there are a number of ways to mail me and they are as follows:

via USPS: 75 Kreger Drive, Wolcott, CT 06716-2702 via CompuServe: ID no. 70645,247 via packet: WA1LOU@N1DCS.CT.NA.USA via Internet: 70645,247@compuserve.com

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Amateur Television Video Tape Contest...

All you have to do is make a video about Amateur Radio using you home VHS/Beta or 8mm video equipment! All licensed Amateur Radio operators are eligible to win, except members and families of the Western Washington Amateur Television Society (WWATS), Amateur Television Quarterly Magazine (ATVQ) or publishers or staff of any other Amateur Radio magazine. That leaves about a half million US Amateurs and any other Amateurs in the world!

Your video tape should have been made since May 1988. The tape must not exceed 15 minutes in length. You cannot use professional video equipment (3/4 inch, 1 inch) in you production chain, only consumer grade equipment: i.e. S-VHS, VHS, Beta, 8mm, Super Beta, etc.

Only one entry per licensed Amateur please. Video must be Amateur Radio related and can be a documentary, educational, technical or entertainment.

Entries will be judged on the basis of creativity, technical merit and effective use of the video medium. Contestants must be original producers. Violation of copyright laws is prohibited and disqualifying.

Winners will be selected by WWATS appointed judges. Their decision is FINAL. No substitution of prizes or exchange for cash value is allowed. Any state, local or federal tax applicable is the responsibility of the recipient. Offer void where prohibited by law.

Winners may be required to attest to compliance with rules of the contest. Winners will be announced at the 1990 Dayton Hamvention. The winner need not be present! All entries become the property of WWATS and ATVQ for the promotional use of Amateur Radio and editorial and promotional uses.

Entries must be postmarked no later than March 1, 1990. Postage due mail will not be accepted. Sponsors and prize donors assume no responsibility for lost or damaged entries. Return postage must accompany any video-cassette to be returned. WWATS is responsible of prizes to winners.

First prize is an Icom IC-1275 1.2 GHz transceiver, second prize is an AEA FS430 ATV transceiver; and third prize is a PC Electronics RX converter of your choice. Additional prizes will be announced.

Send your entry to WWATS/ATVQ Video Contest, 353 S. 116th St., Seattle, WA 98168.

Source: World Radio

Experimental HF Packet Operation...

The ARRL has made its first technology grant of more than $1000 to a team of investigators headed by Stephen Hall, WM6P of Simi Valley, California, for research in diversity reception of high-frequency (HF) packet signals. The objectives of this work are to investigate the benefits of diversity reception of HF packet radio, design practical diversity antenna systems, modem characteristics and receiver design for diversity.

Co-investigators in the team are Andy Demartini, KC2FF of Clearwater, FL; Wally Linstruth, WA6JPR and Bill Lake, WB6RIJ - both of Santa Barbara, CA; Herb Duncan, WE7L and Peter LaCount, W8UXD of Sierra Vista, AZ.

The funds will be used for equipment and other out-of-pocket expenses. The team members donate their volunteer labor and much of their own equipment in carrying out this work.

Source: W5YI Report

Introducing DIGI-CART>64... by Barry Kutner, W2UP and A & A Engineering...

The popular DIGICOM>64 Packet Program is now available in a cartridge, NO DISC DRIVE REQUIRED. The cartridge offers the advantage of being autobooted, making it ideal for unattended operations such as at a hilltop digipeater. Should power be interrupted, the program and parameters will automatically re-boot.

Another unique feature of the cartridge is the ability to re-write and save parameters and stored text without a disc drive and without the need to burn EPROMS. These features are achieved by using EPROM for the main program and EEPROM for parameter and text storage. Unlike RAM, EEPROM's do not require a battery to maintain data storage. You can move the cartridge from one computer to another and all parameters and stored text will also move.

Even though a disc drive is not required for packet operation, the cartridge version of DIGICOM>64 supports all of the disc functions available in the regular program. A modem, which interfaces to the cassette port is still required. An assembled and tested unit is available for $69.95 (#167-ASY) or Kit (#167-KIT) for $49.95 from A & A Engineering, 2521 W. LaPalma, #K, Anaheim, CA 92801 Add $3.00 S/H; California residents 6.25% sales tax. Phone: (714) 952-2114

If you have information of interest to the digital amateur radio community... please let us know.

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by Jonathan L. Mayo, KR3T
3908 Short Hill Drive • Allentown, PA 18104

Landline Telecommunications: Part 1

In past columns, I discussed using your microcomputer as a terminal for radio based digital communications. Now, we are going to explore the world of landline, or telephone, based telecommunications. As amateur radio operators, we gather information about our hobby from a variety of sources such as magazines, newsletters, and books. Amateur radio information exchange has also been affected by the electronics telecommunication revolution. After all, we amateur radio operators are at the forefront of high technology communications systems; it only makes sense that we would be some of the earliest to apply this technology.

Back in the late 1970s when microcomputers were rapidly gaining acceptance by the general population, many amateur radio operators had already taken this new technology to heart. It wasn't long before these microcomputers were interfaced to telephone lines via modems as a means of exchanging information about our hobby. The microcomputer, with its easy manipulation and storage of both numerical and alphabetical information, was an ideal communication tool.

Today, it is possible for you to connect with a variety of other computers using your shack's microcomputer to obtain a wide variety of information about amateur radio. There are private bulletin boards, many of these specialized in a particular subject area such as satellite communications or DXing, run by individuals and clubs as well as commercial information services that contain some amateur radio information. Before going into any more detail about what services are available, let's take a look at what equipment you will need to access them and the terminology that accompanies it.

Landline Telecommunications Equipment

A microcomputer equipped for landline communications is similar in many respects to one equipped for amateur packet radio operation. In packet radio, the microcomputer, running terminal emulation software, is interfaced with a TNC. The TNC is also connected to a transceiver. Information input into the microcomputer is sent to the TNC where it is encoded and converted to an analog signal for transmission by the transceiver. When receiving, the TNC converts the analog signal from the transceiver into digital codes which are sent to the microcomputer where they are displayed on the screen.

A microcomputer equipped for landline communications also runs terminal emulation software. The microcomputer is interfaced to a landline modem, usually via a RS-232 port. The modem is also connected to a telephone outlet. Once connected to another modem attached to another computer, information entered into the microcomputer running terminal emulation software is sent to the modem, where it is converted to an analog signal that is transmitted over the telephone line to the other modem.

All microcomputers that act as digital communications terminals are running some sort of terminal emulation software, a program which allows a computer system to act like (emulate) a dedicated digital communications terminal. Terminal emulator software comes in a wide variety of capabilities. Some simply allow the computer to serve as a dumb terminal while other more complex software allows the microcomputer to function as a sophisticated smart terminal.

Most ASCII (American Standard Code for Information Interchange) telecommunications software packages will work fine with standard microcomputer modems. These are the standard programs used with telephone-based modems to access remote computer systems. There are a great number of terminal programs with an equally great diversity in features and capabilities. Generally, microcomputer systems with communications capabilities have terminal software available for them.

While terminal software can cost up to several hundred dollars, it is not necessary to necessary to spend vast sums of money. There are a great many programs available in the public domain that may be obtained at little or no cost. In addition, many fine shareware programs can be had for very reasonable prices. Often, operating system master disks include some sort of telecommunications capability, especially if the computer comes with a RS-232 port.

If you're not sure what kind of program is best or where to look for one for your particular computer, check with someone who is using the same type of computer you do. If you don't know of anyone, try to locate a user's group in your area; a good place to start is where you bought your computer. Be sure to look at a few back issues of computer magazines for ideas; check to see if there is one written specifically for your microcomputer system. If you own a popular microcomputer system, such as an Apple, Commodore, IBM, or Tandy, you will have little trouble locating terminal software for your machine.

In addition to the terminal emulation program, you will also need a modem. Just as the TAPR user interface is the standard in amateur packet radio, the Hayes command set, also known as the AT command set, is the standard user interface for microcomputer landline modems. There are numerous terminal programs that are capable of automatically controlling modems that make use of the Hayes command set.

There are a great variety of modems available for you to chose from. Simple 300 baud modems can be purchased for well under $100; however, I would suggest buying a more sophisticated and faster modem if you intend to telecommunicate regularly. These days, 1200 baud modems are the norm, costing around $150. But 1200 baud modems are quickly being outdated by the recent influx of inexpensive 2400 baud modems. I own a 2400 baud Everex external modem with Level 3 MNP (MNP is a 5 level error checking protocol that is gaining popularity) that I purchased for about $190.

Most often, identical modems can be purchased in both internal and external configurations. An internal modem is designed to be installed in an expansion slot inside your microcomputer. An external modem comes in a case with a power supply and must be interfaced to your microcomputer via an RS-232 port. I've owned both types and now prefer the external variety because I can easily monitor its control panel, share it with other micros, and it doesn't take up a valuable expansion slot. Keep in mind that internal modems are usually less expensive than their external counterparts due to their lack of a case and power supply.

Telecommunicating

Once you have the necessary hardware, you will need to configure your terminal program. This involves letting the pro-

gram know which port your modem is connected to, what baud rate you will be using, how many bits (either 7 or 8) will compose each bit group, how many stop bits will be sent following each bit group (either 0, 1, or 2), and what kind of parity you will be using (Even, Odd, or None). The most common settings are 7 bits, 1 stop bit, with Even parity and 8 bits, 1 stop bits, and no parity. Parity can only be used with 7 bits because the eighth bit is used as the parity bit. You are probably already be familiar with most of these terms from amateur radio digital communications.

Conclusion

Now that your terminal program can talk to your modem, you can dial another modem and telecommunicate. But first you will need a telephone number for a remote computer system. I'll list several in Part II in the next issue. In the next issue, I'll also discuss the various services available to you and how to access them.

Some Thoughts On Selecting a Computer For The Ham Shack...

Just recently I decided to update my old computer system, a TI-99/4a. This computer was a workhorse for me, but unfortunately there is very little ham software available for this orphan of the early 80's computer wars. I decided that the way to go is "IBM PC Clone" or "PC Compatible". The one thing that these machines share is that they all run under the "MS-DOS" operating system which makes them compatible with each other. There are hundreds of brands to choose from; everyone from Radio Shack to Sears sells these clones under more brand names than can be mentioned in this column. It can be confusing trying to decide which offers the right features that I needed for both ham radio, as well as for home uses such as word processing etc. I'm not professing to be a computer expert. Here is the method I used to determine which one to buy, and maybe my experiences could help you. Here are some key points in my decision making process, not neccessarily in any order: 1. Get the most computer you can for the money you have to spend! In other words, you can always add a color monitor or modem later on. It is much harder to upgrade the speed or features of the computer. 2. Buy a 80286 or 80386 based computer if possible. The oldest and slowest is the 8088 or 8086. While they will work just fine with most software, you are left in the cold with some newer software such as Microsoft Windows that will only run on the '286 or '386. Also when you buy one of these machines- also called "AT" compatible, you get the 101 extended keyboard and one high density 1.2meg 5-1/4 floppy disk drive. 3. Get 640K of memory. Some programs run on 256k some on 350k, some even more. If you can afford it, get 640k right away. Due to import limitations on Japanese chips, memory chips are one of the costs in a computer that will more than likely go up! 4. Make sure the computer you select is "FCC TYPE B APPROVED"!! The "B" interference guideline is for homes and "A" is for office. The "B" standard is tougher on the computer generating RF interference into radio equipment. 5. If you plan to use your computer for packet, make sure that it comes with two serial ports. Especially if you plan to interface your radio to it, or if you also own a telephone modem. A second serial port can usually be added for about twenty five dollars. 6. Alot of the newer machines are being sold with the new 3-1/2 disk drives. These drives hold twice the data of the older and more familiar 5-1/4 drives. The only problem is that until more people start to use them, it will be hard for you to exchange data with your buddies. I suggest having one of each. This way you can have the best of both worlds. Use the 3-1/2 for your data, and the 5-1/4 to run the program. 7. For about 250 dollars, you can have a hard disk with your computer. If you can afford it, do it! It makes the whole system alot more enjoyable but like I said earlier, don't skimp on your computer simply to have one. Where should you look to buy your computer? Well, if your not very technical or cant be bothered with the details by all means go to a full service computer store. They will set it up for you, show you how to use it, even install it for an extra charge, and sell you classes on how to use it. The second choice is to buy from a department store where you can usually get a better price, but no service. Of course if something is wrong with it, usually returns for service can be conducted right from your local store. Then for the stronger willed there is mail order from one of hundreds of companies, mostly operating out of California's silicon valley. This is what I did. If you are careful and take your time making your decision, you will save hundreds of dollars and have your computer configured exactly for you. For example, the basic computer I ordered came with 512k and only one serial port. It was very easy to have the computer delivered from the factory with 640k and 2 serial ports. I just asked, paid a little extra and shazam! Try doing that at a department store! The best place to do your comparison shopping is a magazine called COMPUTER SHOPPER. It comes out monthly and is almost nothing but wall to wall ads for all kinds of computer equipment and peripherals. Go thru it and compare features and specs. Pull out the best five or six ads and call for more info. Ask for a quote on the computer exactly as you would want it. Don't forget about shipping charges, one dealer wanted to charge me One hundred for regular UPS, while most others wanted around thirty. After you have done your calling, make yourself a chart and see which one most suits your needs at a reasonable cost. If you think this is alot of work, well you may be right. I believe it was worth the time for me, and I learned alot in the process. Looking back on my purchase decision, I don't believe that I could have done any better on price, selection, or the company that I chose to do business with.

de Ken VanTassel, N1FYF

(cont'd from page 7)

advice on where and when to tune in the spacecraft. W1AW at ARRL Headquarters and W5RRR in the newsroom of Johnson Space Center will both be used as media showcases.

A prime objective of both missions is school participation. A pre-flight videotape, showing the astronauts explaining their equipment, an orbital tracking map and an informational packet explaining the SAREX program and amateur radio in general, plus a suggested curriculum, prepared by educators for in-school activity will be available. NASA has promised full cooperation using their SpaceLink Computer Network and allied educational facilities. Each astronaut will make at least one transmission on NASA video and audio circuits to show their stations, and a Post-Flight videotape will be made available to all clubs and schools that take part.

In addition, a Teleconference Radio Net to feed most amateur repeater stations in the United States is also planned. The repeaters will permit easy access to schools and the youngsters attending them. With the help of amateur radio clubs and members with hand-held equipment, students will be invited to share directly in the flights. Most will have their questions answered and from some locations, they may even be able to talk directly to the astronauts. This project is co-sponsored by the American Radio Relay League and AMSAT-NA. ARRL is lead organization for information, education and support. AMSAT-NA is lead for technical operations.

The Johnson Space Center Amateur Radio Club, as always, is in charge of in-flight equipment and flight planning. The Motorola Amateur Radio Club of Schaumburg, Illinois has provided the specially-built transceivers and antenna. Terminal Node Controllers have been supplied by the Heath Company.

In the 1980's, the original SAREX flights gave a dramatic public display of amateur radio in space. SAREX-90 presents an even greater opportunity. With packet radio, radio relay, teleconference and video demonstrations, it will show the world of amateur radio at its very best.

by Roy Neal, K6DUE

Source: W5YI Report

Summary of Amateur Satellites Set for Early 1990 Launch...

Microsat "A": is known as PACSAT and is sponsored by AMSAT-NA with a lot of help from the ARRL and TAPR. It is a digital store-and-forward packet radio satellite. Mode J configuration: Uplink on 2 meters, down on 70 cm.

Microsat "B": is known as DOVE, an acronym for Digital Orbiting Voice Encoder. Sponsored by BRAMSAT, AMSAT Brazil, DOVE will be used for amateur radio and educational applications. It will put out garden-variety packet on 2m unlike the other satellites which require exotic modems to demodulate. Downlink ill appear at 145.825 MHz with synthesized speech output which can be received on pocket scanners and hand-held transceivers.

Microsat "C": also known as WEBERSAT, was developed by students at the Center for Aerospace Sciences and Technology (CAST) at Weber State College in Ogden, Utah. Among its experiments is a special CCD camera which will snap images of earth from space and store them in the on-board computer memory for later downloading as packets to ground based stations. Special software will compile the packets for video PC image display.

Microsat "D": sponsored by AMSAT Argentina is also known as LUSAT. It is basically a clone of the PACSAT, Microsat "A" and has a beacon that will transmit Morse code telemetry in the 70 cm (450) MHz ham band.

UOSAT "D": is also a digital store-and-forward bird... but at a much higher data rate, 9600 baud. (UoSAT's A,B, and C have already been launched. "D" is a continuation of the program from the UK's, University of Surrey.) UOSAT "E": has a number of experiments in it - including an on-board camera.

by Bob McGwier, N4HY / Doug Loughmiller, KO5I, AMSAT

Source: W5YI Report

If you have information of interest to the digital amateur radio community... please let us know!

(cont'd from page 13)

people in our society and how this limits the incentive for talented people to pursue the software field. This is a national problem for we have already lost a great deal of our technological edge in the world. If this is truly the information age we can not afford as a nation to discourage people in one of the few remaining fields that will allow us to compete in the world market.

Technology is changing our hobby. Microprocessors already in Transceivers and Terminal Units are finding their way into Amplifiers and other Amateur Radio peripherals. The future of our hobby will be based as much on software as on hardware products. If we are not careful we will end up not having anything new to play with as the few manufacturers we have in this industry will devote their efforts to the commercial and government markets where there is some protection against software piracy by strong internal non-copy policies.

by Thom Ashton, NY2I

COMMODORE HAMS...

A & A Engineering, Inc. offers you a "Choice" means of getting on packet. Now you can choose between the popular software-based DIGICOM>64 system designed by Barry Kutner, W2UP or the NEW DIGICART>64... It's Digicom>64 in a cartridge! NO DISC DRIVE REQUIRED. Either way, you get an effective, and economical approach to joining the packet excitement.

DIGICOM>64 software-based program requires a simple modem interface which plugs directly into the C-64 cassette port or can be remote mounted via cable. A watchdog timer, reed relay PTT and PTT inversion are included. No alignment is required. Operates VHF & HF packet. The Digicom>64 modem, including FREE software is available wired(#154-ASY) $79.95 or in easy to assemble kit(#154-KIT) $49.95 (add $2.50 s/h).

DIGICART>64 features include autobooting and the ability to re-write and save parameters and stored text without a disc drive. Supports all the disc functions available in the regular program. Uses and requires same modem as software version mentioned above. Digicart>64 assembled and tested (#167-ASY) $69.95 or kit version (#167-KIT) for only $49.95 (add $3.50 s/h). VISA/MC ACCEPTED. CA residents add 6.25% s/tax. Order from: A & A Engineering, 2521 W. LaPalma #K, Anaheim, CA 92801. Ph# 714-952-2114.

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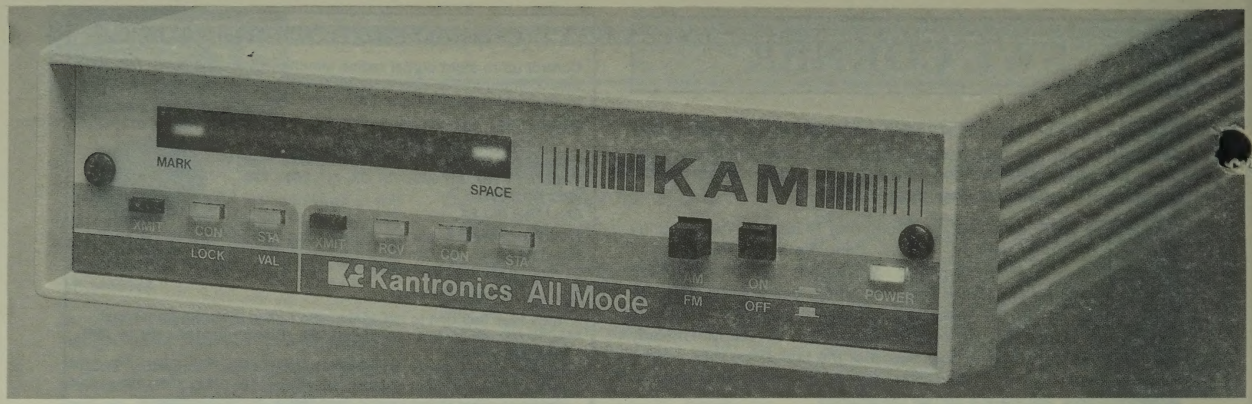
Ever tune to WWV on 10.000 or 15.000 only to hear WWVH in sunny Hawaii booming in over Ft. Collins? Jane Barbie is the beautiful voice that announces the time and always adds "Aloha" to their top hour ID. All during the 1960's and 70's Jane was the same recorded voice you'd get on the telephone for wrong numbers, or out of service, etc. By the way...in case you're ever on Jeopardy: The lady who replaced Jane and is now queen of the telephone recording is Ramona Lenny out of Philadelphia. She is the automated voice of every directory assistance across the country.

Back to WWV. Now and then you've most likely left it on in the shack while you're doing something else. And somewhere between the time turn on the clanging WWV second tones and finally turn it off to escape the building headache...you might have noticed "other" stations in the background. Everything from CW ids to second marking "pips" to what sounds like deliberate interference! What you're hearing are the myriad of other time stations that share the 10.000 and 15.000 frequencies. I'm amazed at how many there are (and how many I've QSLed!) Since you're a ham, listen beneath WWV and WWVH for very readable CW IDs that are repeated once or twice every 10 minutes or so. Copying all of these in the AM mode is super-easy. Flip right to 15.000 AM-mode and listen for the Russian "RWM" spilling over from 14.996 with 8kw. And, little 2kw "JJY" from Tokyo right on 10 & 15 exactly. When the north-south path is good "LOL" from Argentina is cake with their 3 minute dash and voice ID "Observatorio Naval Argentina...hours..minutes!" It only takes about 5 minutes of listening to catch them all and find out where 20 meters may be open to!

de Jim KS1A / Billerica Amateur Radio Society



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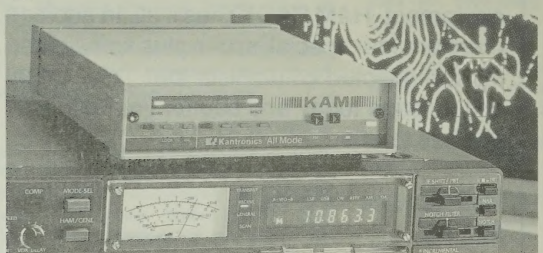

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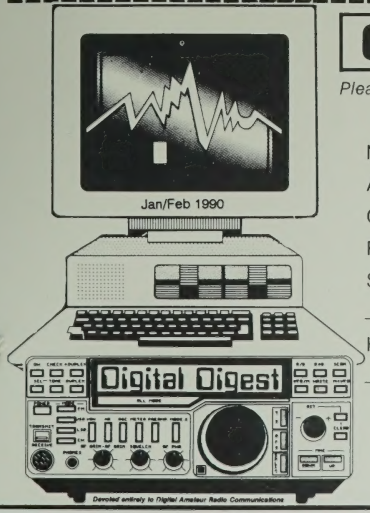

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